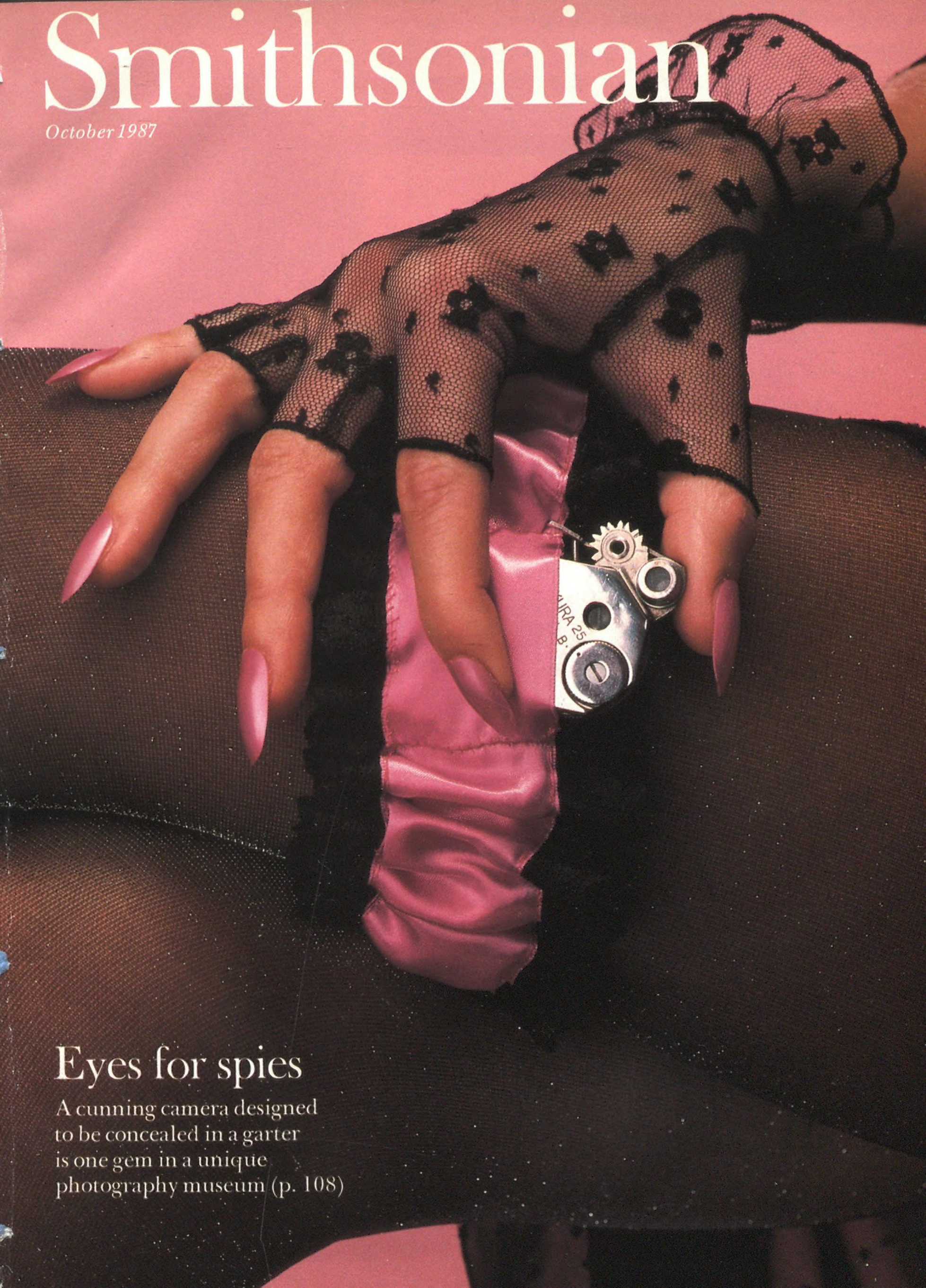
Smithsonian

October 1987



Eyes for spies

A cunning camera designed to be concealed in a garter is one gem in a unique photography museum (p. 108)

300E

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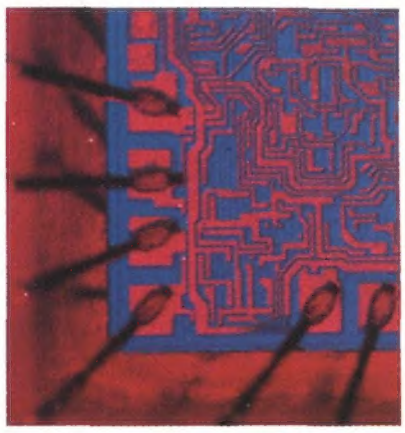

Then came the most critical phase of development. Engineers slipped into a fleet of prototype 300 Class sedans. Set off in search of every conceivable driving extreme. And themselves became the test instruments—even more sensitive and discerning than those they left behind in their laboratories.

It was during long autobahn treks, protracted Alpine climbs, in the searing heat of the American West and bitter Arctic cold that the six-cylinder engines proved their mettle—thriving under adversity, forging an unprecedented blend of speed and silence. Corkscrew mountain passes and corrugated gravel paths vindicated the engineers' inspired application of spatial kinematics—a multilink independent rear suspension that promoted quick, sure handling without sacrificing the fabled Mercedes-Benz ride. On slick downhill grades and snow-covered turns, the Anti-lock Braking System (ABS) turned potential drama into controlled, unruffled stops. And the technology proved not only remarkably advanced, but remarkably reliable as well.

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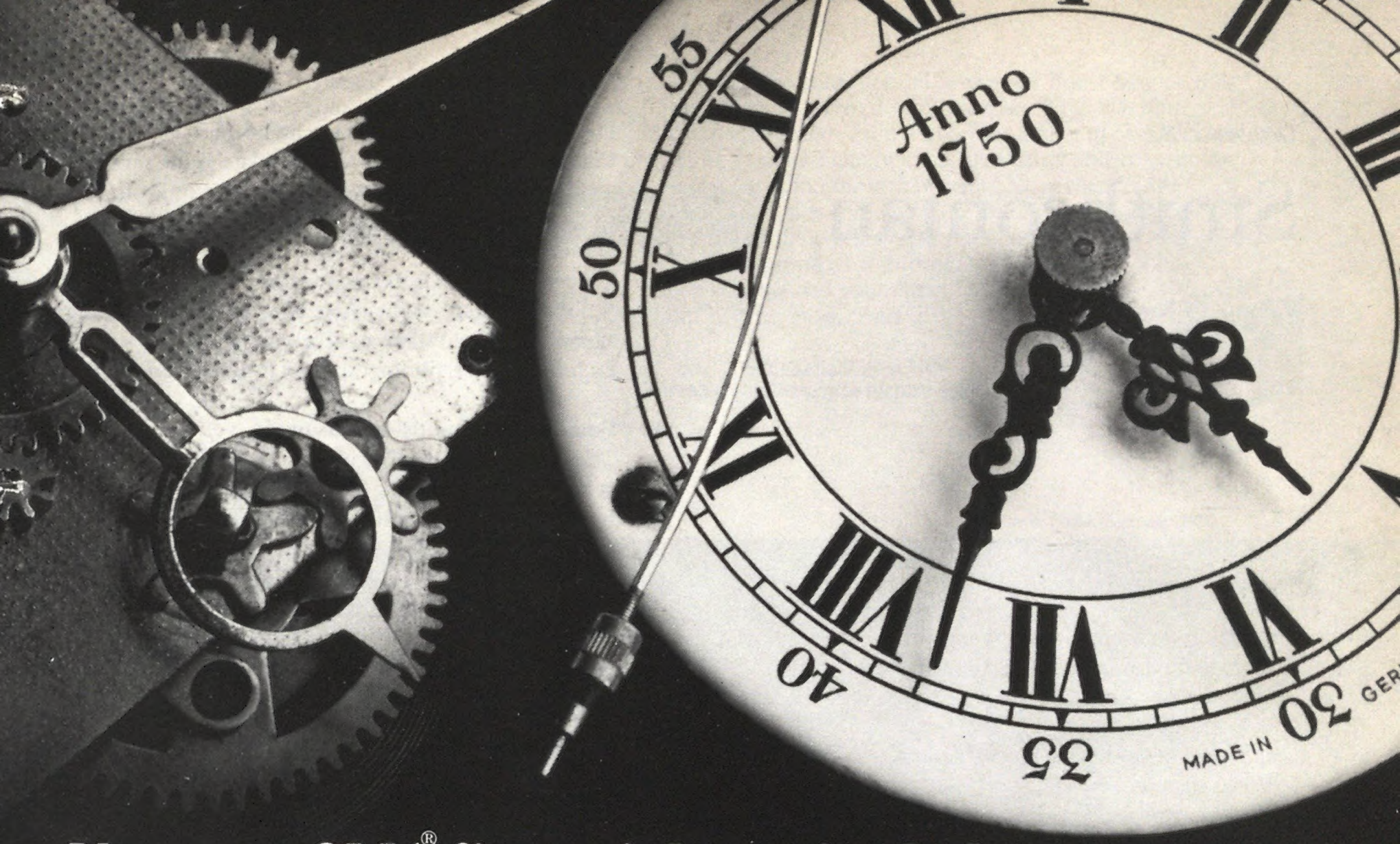

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October 1987

Smithsonian

Volume 18, Number 7

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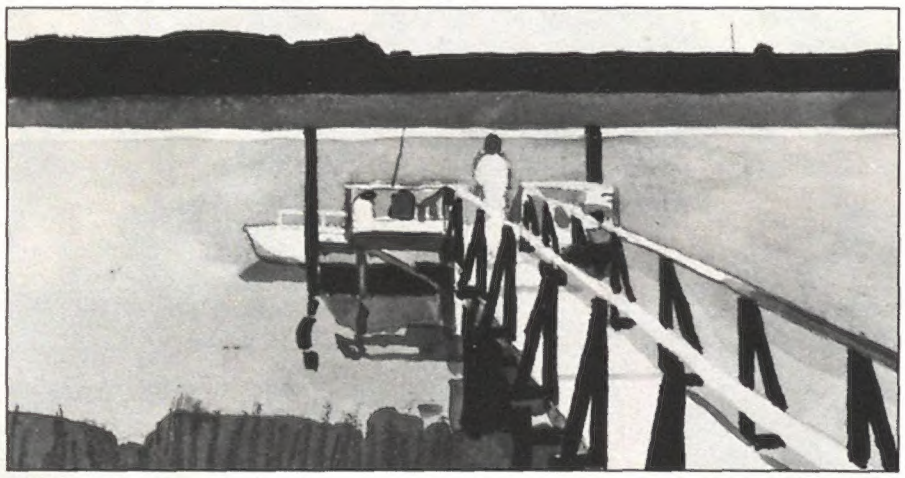

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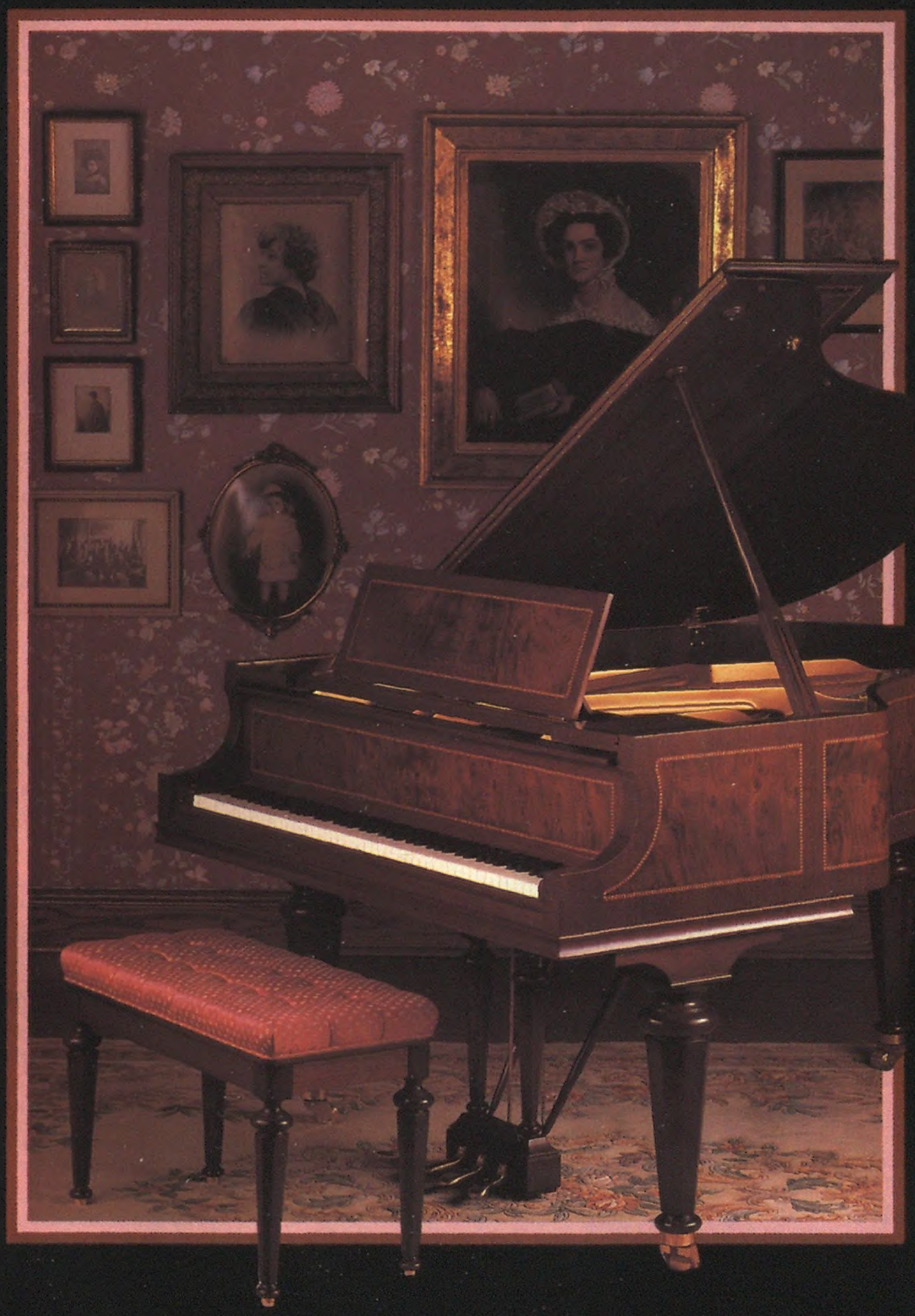

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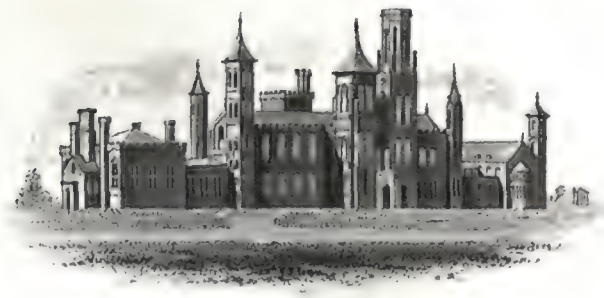
Secretary Adams' comments

Smithsonian horizons



Dr. Arthur M. Sackler, for whom our new gallery is named, sought to link the arts and sciences with the humanities

One of its central, moving spirits was missing when the Smithsonian's great Quadrangle complex of underground museums and other activities opened in late September. Dr. Arthur Mitchell Sackler, whose unsurpassed private collection of Chinese antiquities forms the core of a munificent gift now permanently housed there in a gallery bearing his name, had died just four months previously. He was an exemplar as well as a supporter of all of the unities of creative life whose advancement lies at the heart of our mission.

It is of course a matter of regret that Arthur did not live to take pleasure in the inauguration of what turned out to be his culminating gift. But already long before, his had become an extraordinary record of patronage that spanned the arts, sciences and humanities. Highly successful as an entrepreneur in medical publishing and other fields, he pressed ahead with visionary new funding commitments that kept pace with, and at times even threatened to outrun, his wealth.

Arthur's own career was as wide-ranging as his patronage, including an early chapter as a pioneer in biopsychiatric research. But it was as a great collector that we knew him best—a collector committed to the unfettered public enjoyment and scholarly appreciation of the objects it was his passion to acquire. In the weeks before his death he was especially troubled by the recent explosion of prices on the world art market, which has the disturbing implication that public museums are more and more hard-pressed even to enter the bidding. Had he lived, it is likely that he would have played a powerful, behind-the-scenes role in a national effort to assure that at least the greatest treasures to go on the block would find a permanent place in the public domain.

So it is natural that in remembering him I should turn to the prefaces that he wrote in the many-volume series by which his collections are also being made permanently accessible. Having sought in his own research "to convert psychiatry from a 'soft,' subjective science into a 'harder,' more objective science of metabolism and biochemistry," there is perhaps an irony in his personal emphasis on the discerning eye of the connoisseur. "A real collector adds a revelation, an insight—more than the sum of the collection's parts," he once observed on a *Smithsonian World* television program.

But the intellectual rigor of the researcher remained the same, and some compensation for subjectivity was sought in a determined, costly effort to add to the mass of observable examples:

> For me, a preeminent function of collecting has been the reconstruction of civilizations, of different cultures, and this goal can only be achieved through scholarly studies. In collecting, as in the sciences, when a large enough corpus of material has been gathered, a representative as well as a true reconstruction of the past can be attempted. In such a total historical reconstruction, it is vital that study materials as well as masterpieces be preserved, and the lifework of other collectors is, of course, vital in this regard.

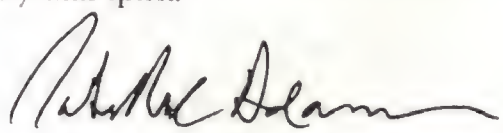
Chinese archaic jades and the great Shang and Zhou ritual bronzes were perhaps his most abiding interest, with deep understanding as well as admiration reflected in his references to their "subtleties and nuances," their "exquisite intimacies and secrets" and the "soul-fulfilling esthetics" of Chinese art more generally. The bronze-caster's art, in particular, for him symbolized an unrivaled technological mastery over beautiful but refractory material,

> an affirmation of Man's intuitive esthetic sensibilities in conjunction with two great fundamentals: skill and technology. It represents, in the early days of Man's civilization, a supreme manifestation of the power of such a combination.

This linking of technology with art, of science with the humanities, was, in a sense, the lesson of his life. "Art is a passion pursued with discipline," he observed to his television interviewer, while "science is a discipline pursued with passion." Seeking "to experience as close as one can, at first hand if possible, the creative impulse which moves a master" in either of these domains, he found it

> among the most exquisite expressions of what Man can create—out of dead mineral and intense fire—seeking to fulfill visions of imagination with discipline and experience. They are also a triumphant demonstration of how one people can speak to all people; how artists can speak to everyone across the void of time and vastness of distance; and how a past civilization can relate to the present through the power of its art. . . There is an intrinsic unity in Man's esthetics, even as there should be a unity of respect and understanding among all humankind.

The gallery that bears his name, like the National Museum of African Art that now adjoins it, will carry on its functions in precisely that spirit.



"Still–in a way–nobody sees a flower–really–
it is so small–we haven't time–
and to see takes time, like to have a friend takes time."
—Georgia O'Keeffe

Red Poppy, 1927 *Oil on canvas 7" × 9", Private collection, Geneva*

Photography by Malcolm Varon

GEORGIA O'KEEFFE 1887-1986

National Gallery of Art, Washington · November 1, 1987-February 21, 1988
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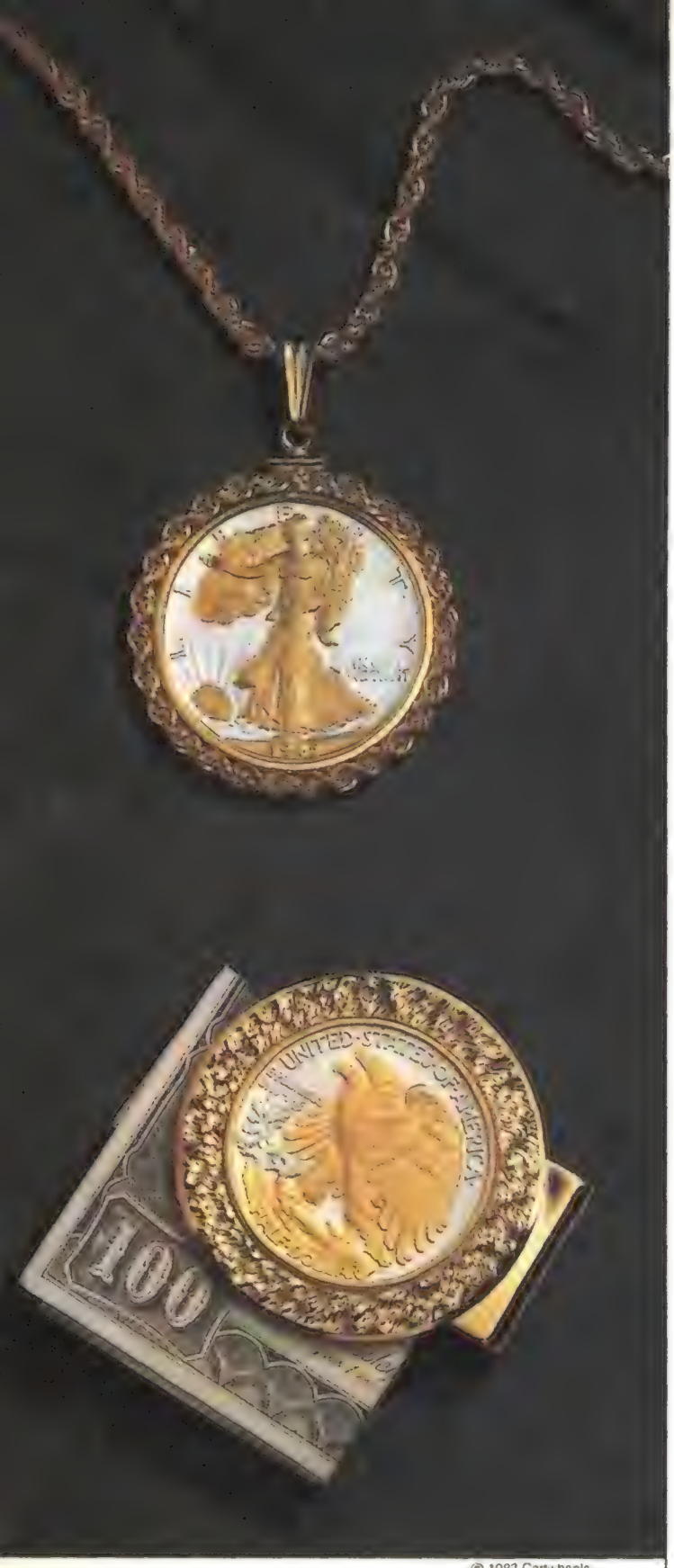

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Letters to the Editor

Quantum mechanics

Dear Sir: I sympathize with Mr. Trefil's problem, as recounted in your August issue, of driving to work, having coffee and then sitting at his computer terminal where he leaves "a familiar, cozy environment" and enters "a place where things act in strange, virtually inexplicable ways."

He might feel better knowing that his is not the only occupation with this problem. I work for the Treasury Department's Office of Tax Analysis and, during the recent tax reform effort, spent many hours on Capitol Hill, working with Congressional staff and watching the debate. When it comes to a place where things act in strange, virtually inexplicable ways, it is hard for me to believe that quantum physics' world can beat the halls of Congress.

Daniel J. Frisch
Potomac, Maryland

Dear Sir: I attended a lecture on the nature of the electron by Dr. Ralph Overman in Oak Ridge, Tennessee, in 1964. After thoroughly discussing the wave-particle dilemma, Dr. Overman, replying to a student's question, stated that he solved the problem by teaching the particle nature of the electron in his Monday, Wednesday and Friday classes. On Tuesday, Thursday and Saturday he opted for the wave theory, and on Sunday he prayed that someone would find the solution.

Mary A. Rossman
Brooklyn, New York

Underground New York

Dear Sir: Anent your article, may I share my own subterranean story with you?

One morning, on my way from the IRT

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to my office on Broadway at 40th Street, a very special bracelet came off my wrist and fell through the subway grating between 36th and 37th. Not nearly as costly as an Elizabeth Taylor diamond, it was just as valuable to me.

After phone calls to what seemed like every subway and maintenance official in New York, I wound up in a subway station field office, explaining my story once again. The field manager, John Hickie, took a personal interest in my sad plight and led me through the subway underground. After many fruitless attempts to locate my bracelet, I left; but Mr. Hickie did not give up. He got a mason to free the grating from the concrete sidewalk. Next day, when I came out of a meeting, exactly 29½ hours after I lost the bracelet, there it lay on my desk! It's not often, in a city such as this, that one meets people like Mr. Hickie and his crew, who really care about others.

Lisa Brandinelli
Staten Island, New York

Dear Sir: In the early 1930s, when the 8th Avenue subway tunnel was being built, there was a deep open stretch near 34th Street. One cold morning a workman built himself a fire for warmth and, needing additional fuel, helped himself to what he took to be a long piece of abandoned timber. He sawed through it, and instantly hundreds of lights flashed on the boards of the central office of Holmes Protective Service nearby. He had cut a New York Telephone Company conduit, containing wires connecting Holmes with subscribers. It took nearly a week for New York Tel, working around the clock, to splice together all those cut wires.

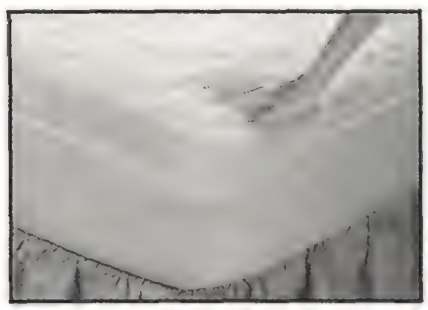
John Turnbull Quigley
Clementon, New Jersey

Lighthouses

Dear Sir: I was concerned that there were no pictures of lighthouses from the Chesapeake Bay. An avid sailor, I have come close to quite a few, notably the Thomas Point and Harper Strait lighthouses. The latter [right] is preserved at St. Michael's, Maryland, at the Chesapeake Bay Maritime Museum. Built in 1879, it was moved to the museum in 1966 to prevent its demolition and to preserve a bit of Chesapeake Bay lighthouse history.

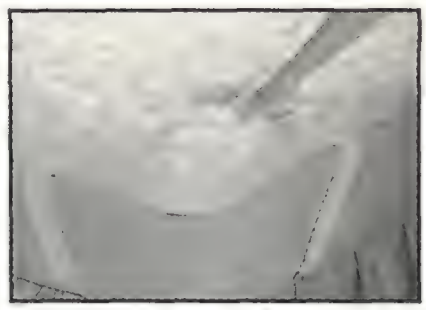
John D. Cipriano
Huntingdon Valley, Pennsylvania

Dear Sir: Sakonnet Lighthouse was in service at the dangerous entrance to the river of that name, between Sakonnet Point and Cormorant Rock, from 1884 until 1955, when it was decommissioned



Regular

Deluxe



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after severe damage in the 1954 hurricane. Now, the Friends of Sakonnet Lighthouse have restored this historic beacon at a cost of $100,000, using private funds and a $25,000 grant from the state. We have also created an endowment of $51,000 for future maintenance. And, because insurance for a private group would be prohibitive, we are asking the Coast Guard to automate it with a solar-powered light, as a valuable navigational aid.

Orson L. St. John
Little Compton, Rhode Island

Dear Sir: Avast there, Dennis! Your contention that use of the stalwart lightships ceased in 1950 was off course. The *Huron* was not withdrawn from service until 1971, after marking the approach to the Saint Clair River at the lower end of Lake Huron for 35 years. The last of 22 lightships that once aided mariners on the Great Lakes, America's inland sea, is now a floating museum at Port Huron, within sight of her old station.

And the lightship *Ambrose* was still in service off New York as late as 1964.

Mark L. Thompson
Petoskey, Michigan

Dear Sir: I can testify to the interest in the *sounds* of lighthouses. In 1970 I recorded, by accident, the sound of the old St. Joseph, Michigan, diaphone foghorn. Months later it was replaced, without warning, by an electronic signal.

St. Joseph's was one of the last diaphones on the Great Lakes—perhaps in the entire country. Orders for the audio cassette I began marketing in 1985 often are accompanied by memories of other diaphones along with thanks for saving the sound—which makes my little company a joy.

Elowyn Ann Keech
Fog Horn Records & Tapes
St. Joseph, Michigan

Dear Sir: Your cover picture is the North Head Light, on the headland of that name. Moored beside it is the largest artifact of the Columbia River Maritime Museum and last lightship to serve at the mouth of the river—the *Columbia*.

Carol B. Moore
Astoria, Oregon

We regret having misnamed North Head Light. Ed.

Desert lizards

Dear Sir: Each summer, Tucson's "Weather Wrangler," Michael Goodrich of

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Channel 4, whimsically describes to desert newcomers the Arizona "stick lizard," which carries a stick in its mouth. When the sand becomes too hot, Goodrich explains, it puts the stick upright in the ground and climbs up to cool its feet.
M. A. Pritchard
Tucson

Dear Sir: Bil Gilbert's enjoyable article described the chuckwalla and the desert iguana as vegetarians. In truth, both of these lizards will eat quantities of insects as well as a wide range of plant materials. The iguanas in our California Living Museums have eaten 20 to 25 meal worms from the fingers of this animal keeper, with relish, and the chucks will eat eight or ten at a feeding.

Chucks make rather temperamental captives, but the iguana is certainly among the most charming and adaptable of pets. These swift, elusive lizards think they are people within three days after capture, riding on one's shoulder and eating freely when hand-fed.
George H. Hanley
Bakersfield, California

Leonardo

Dear Sir: Having read John P. Wiley's article, I will be on the lookout for the nearest museum showing Roberto Guatelli's models of Leonardo's machines. When in Milan, your readers should be sure to see Leonardo's locks on the Naviglio, a barge canal connecting rich farmland to the city; his Codex Atlanticus in the Pinacoteca Ambrosiana; and a permanent exhibit of about 65 models of his machines in the beautifully restored Monastero Olivetano di San Vittore al Corpo, now a museum of science and technology.

Opened in 1953, the museum is the result of years of effort by industrialist Guido Uccelli, aided by my father, Carlo Foa, then chairman of the department of physiology at the University of Milan.
Piero P. Foa
West Bloomfield, Michigan

Dear Sir: The odometer caption on page 92 credits Leonardo with inventing a series of odometers. Not quite so. He adapted an ancient system. In Vitruvius' *Ten Books of Architecture*, written around A.D. 20, Vitruvius described, in Book X, an odometer "transmitted by our predecessors," for measuring, in Roman miles, the distance a carriage traveled. He also

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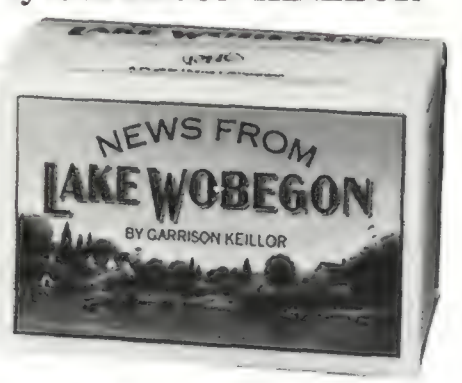

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suggested that the same mechanism, operated by a paddle wheel, could measure distance through the water.
R. Bottum
Van Nuys, California
Mr. Bottum is correct. Our caption should have read "designed." Ed.

Folkways Records

Dear Sir: The three people in the photograph on page 112 are identified as Sholem Asch, Madja and "a friend." The latter is the renowned Yiddish actor Maurice Schwartz. Had this picture appeared in the tabloids of the time, surely the caption would have read: "Maurice Schwartz, noted actor, with friends."

These two robust egos needed someone to stand between them!
Ruth Weliky
Brooklyn, New York

Dear Sir: We were quite amused by Folkways' album cover, *Essentials of Latin*. The photograph is of a Greek bronze statue, *The Charioteer*, a favorite of ours since we first viewed it at ancient Delphi in Greece.
Pomus B. and *Lucy Fasules*
Fairborn, Ohio

Dear Sir: I met Woody Guthrie aboard the SS *William Floyd* sailing in convoy during World War II. This tall, lanky merchant seaman carried his guitar and typewriter with him wherever he went.

On long Atlantic voyages we talked about his music and travels. Many evenings he entertained off-duty officers and men on the fantail, playing his guitar, singing songs from his vast repertoire.
Albert Chase
Newton Centre, Massachusetts

Genetic engineering

Dear Sir: Your article convinced me that the researchers at Berkeley are greater masters of obfuscation than the people we so recently watched on TV during the Iran-Contra investigation.

Something else bothered me. If Mr. Lindow is so certain as to the harmlessness of his little bugs, why then does every photograph show him covered entirely with protective clothing? And the photo of the EPA employee on page 134 does not do much to create public confidence, either.
Alfred M. Slatkin
Teaneck, New Jersey

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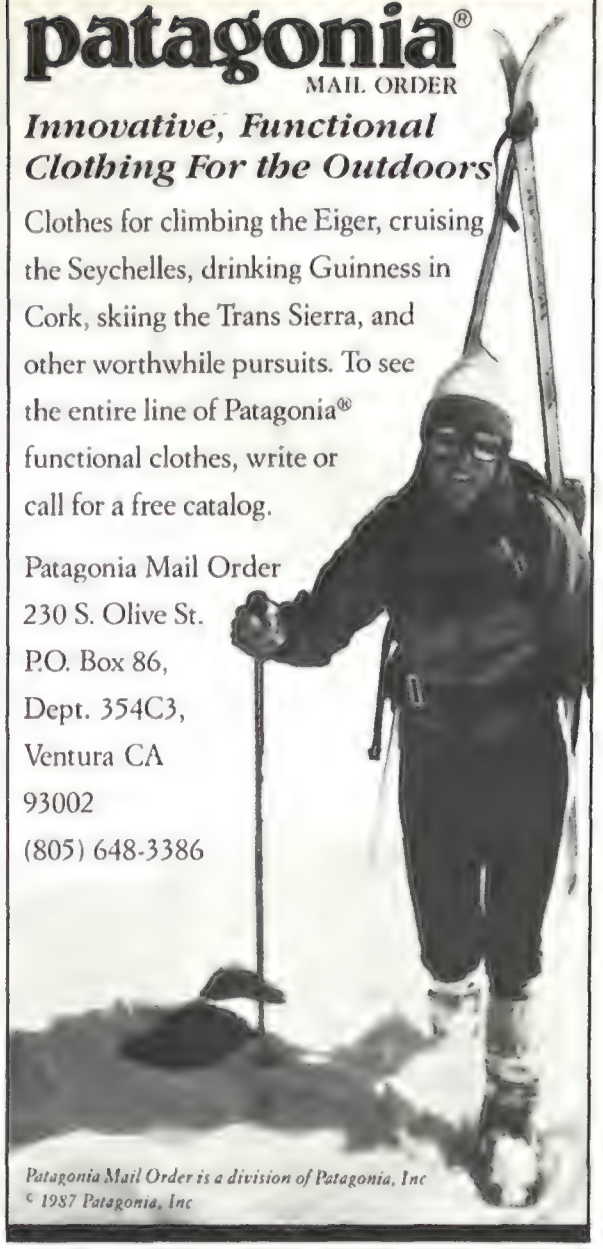

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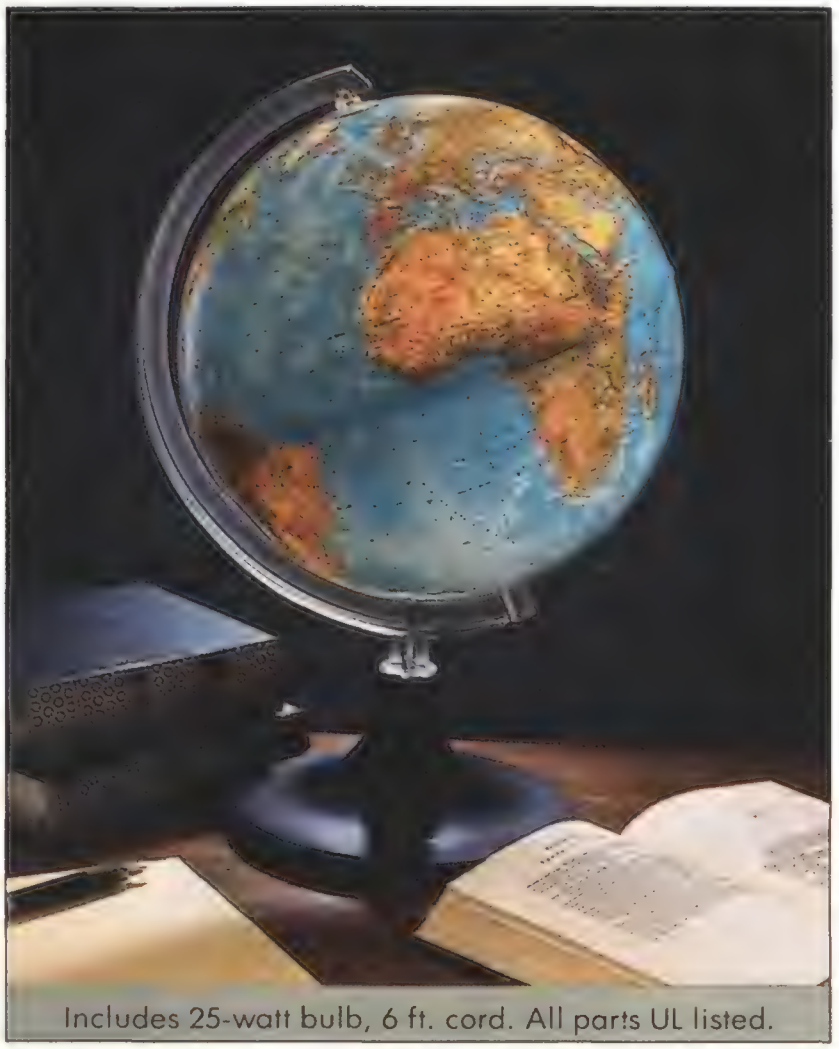

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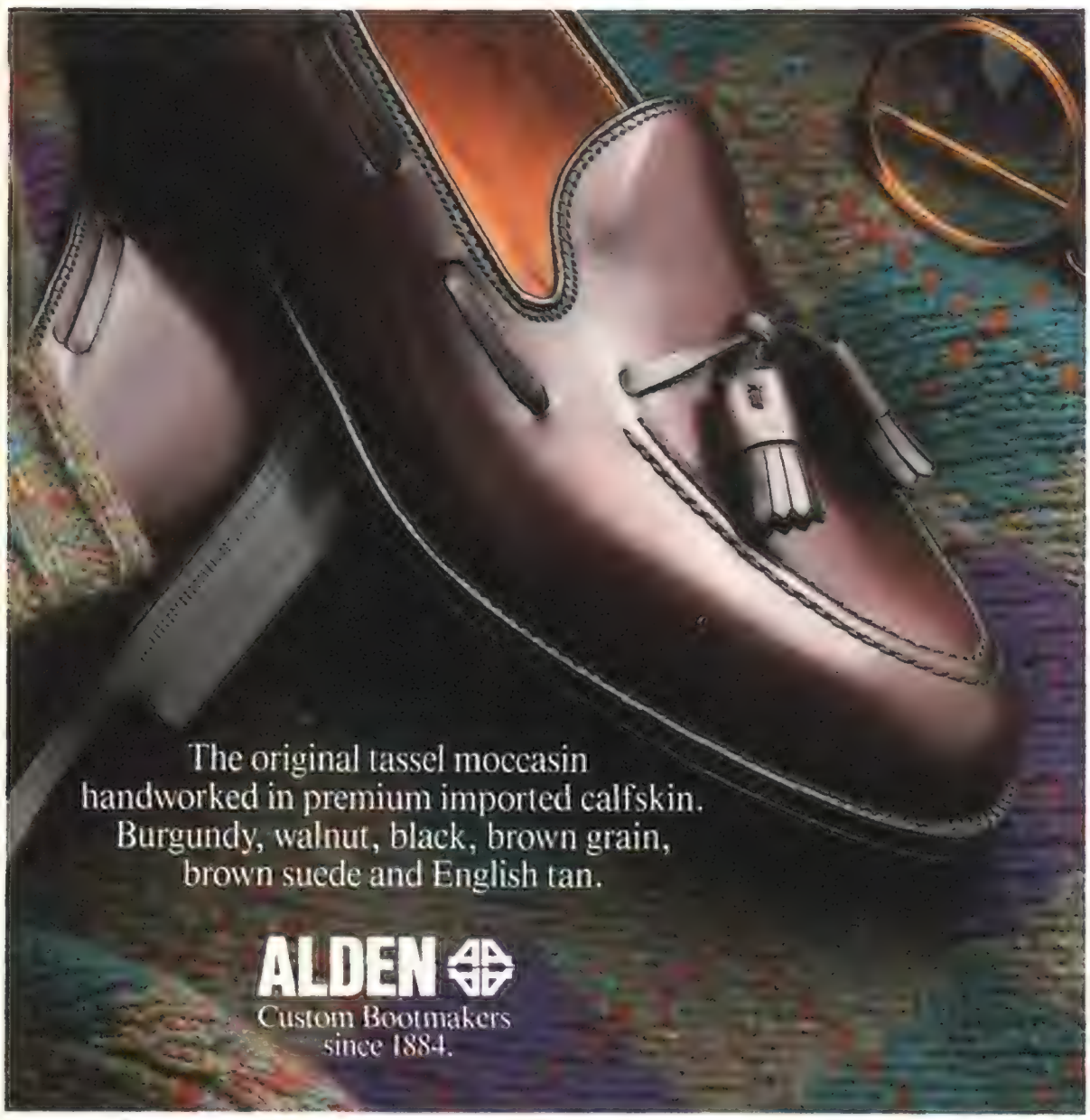

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Although EPA has analyzed Lindow's work and found no adverse affects, regulations require use of protective clothing whether a substance is proved harmful or not. Ed.

Dear Sir: As one of the grass-roots refuseniks who fought to stop the genetically altered bacteria being used here in Tulelake, I would like to tell Professor Lindow that the public is not so poorly educated in scientific processes as he thinks. Yes, we are susceptible to emotional arguments, but we are also in touch with our hearts, more so than he, who is against "lay people standing up and saying they need to make the decisions—they're not equipped to do so."

That type of belief has allowed so much harm in the name of science: atomic weapons, germ warfare, agent orange, to name a few. It upsets me that some scientists have only contempt for us lay folk; we, after all, are the ones who pay for the experiments—in more ways than one.

Testing goes on at our lovely, lonely corner of Northern California, while we lay folk cut our grain and gear up for potato harvest just like always.
David Porter Misso
Tulelake, California

Dear Sir: Your article brought back memories of a summer I lived in Tulelake while working as a nurse in Klamath Falls. I had to leave by 6 A.M. in order to be at work on time. It was a long, lonely drive and all my car radio could pick up at that hour were farm reports, crop prices, weather conditions and commercials for associated products. One commercial, played with maddening frequency, was a jingle that sticks in my head to this day. Use of a particular pesticide was guaranteed to "keep your spuds from turning into duds."
Beth Hamilton
San Diego

Dover Publications

Dear Sir: I read the article about Dover in your July issue with great interest. Unfortunately, the material about me on page 88 is not correct. I am not 70 years old, but 67. Nor was I a "vice president of advertising." I was managing director and executive vice president for a total of 17 years, second in command to the president. I also did far more than edit a few mystery books.
Everett F. Bleiler
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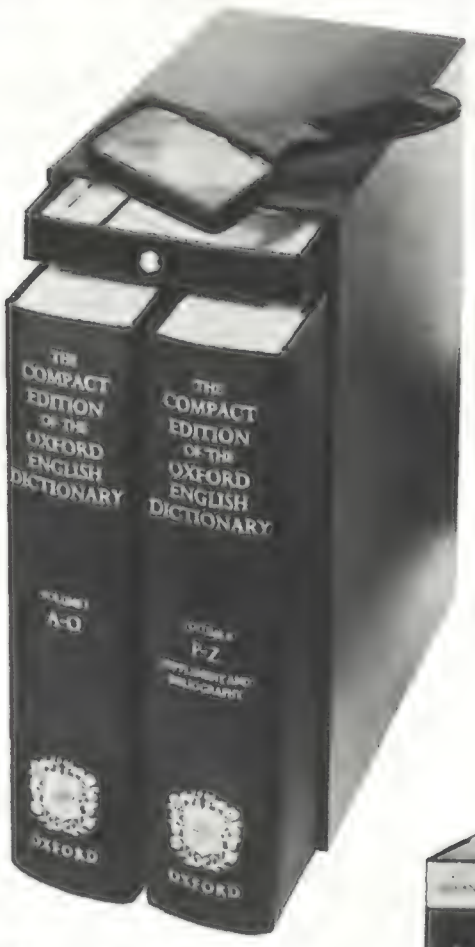

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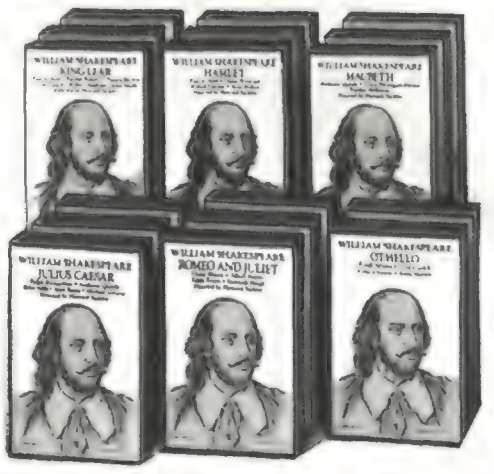

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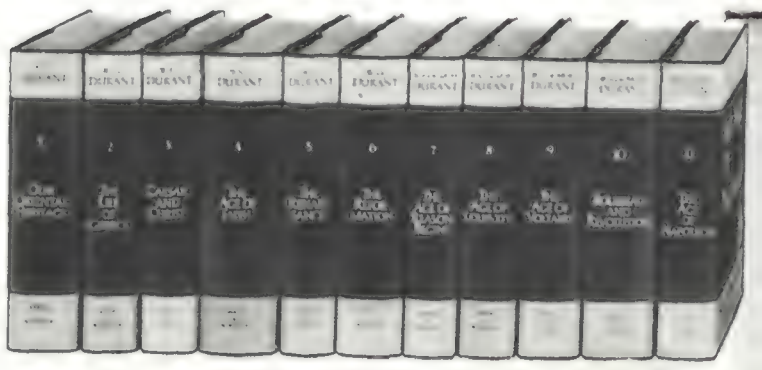

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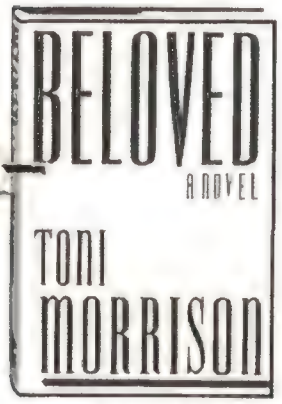

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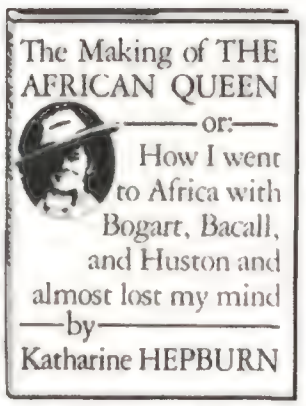
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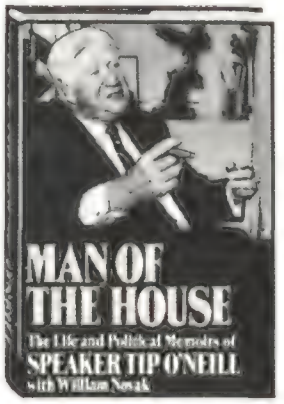

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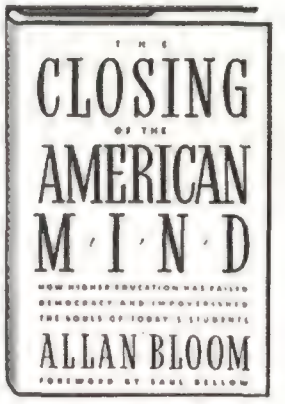

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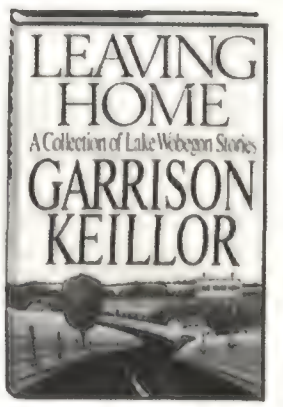

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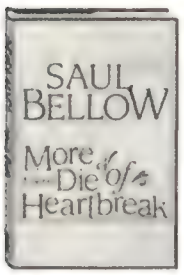

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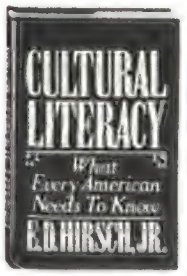

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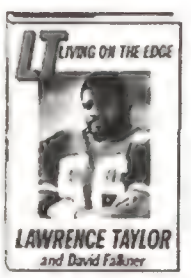

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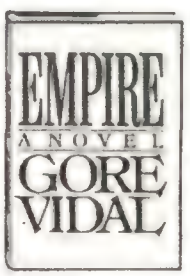

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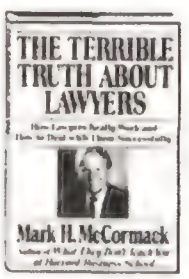

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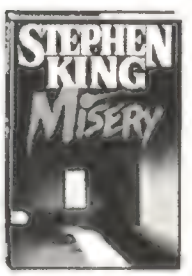

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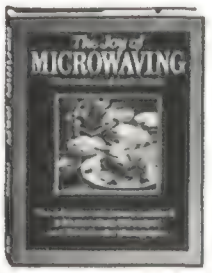

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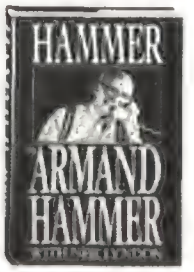

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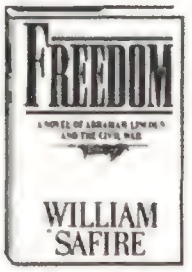

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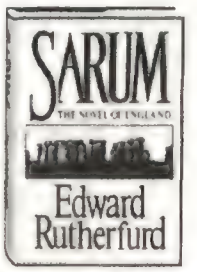

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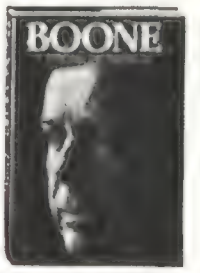

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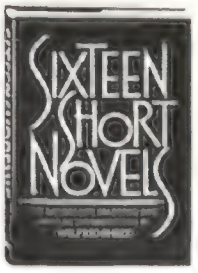

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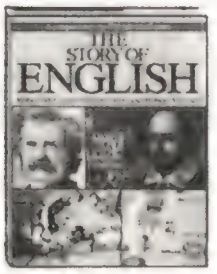

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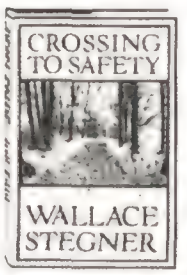

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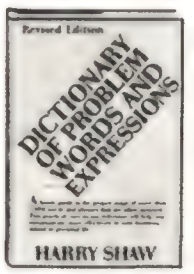

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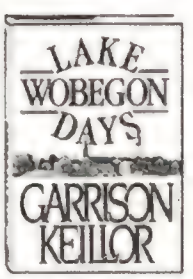

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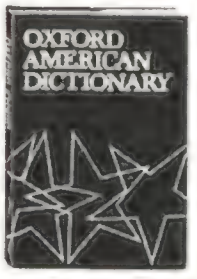

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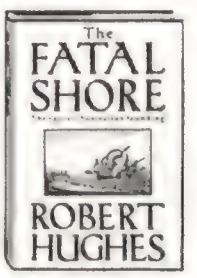

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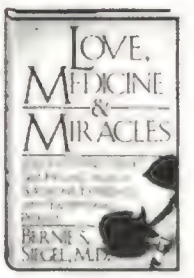

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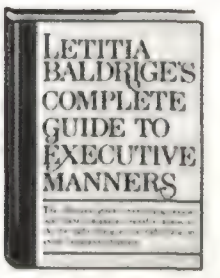

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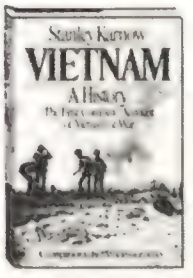

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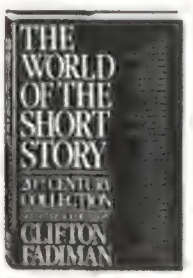

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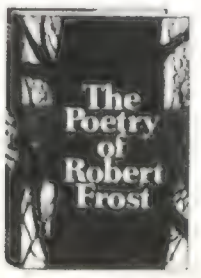

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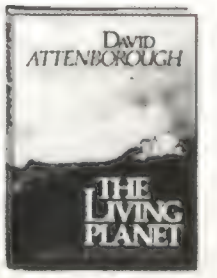

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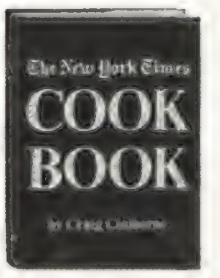

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Around the Mall and beyond

A lot of people at Front Royal, Virginia, got pretty sick of chicken dinners last summer. The Smithsonian's Conservation and Research Center in the Blue Ridge Mountains was hosting its seventh Wildlife Conservation and Management Training Program, and since the trainees came from a dozen tropical and semitropical countries, their food requirements seemed rather daunting compared with your everyday Virginia cooking. Muslims don't eat pork; Hindus don't eat beef; vegetarians are vegetarian; others have specific national preferences. With such tastes and taboos, chicken is a pretty safe bet. And when I visited the course at the end of July, the student body of 21 young to middle-aged men and women, all committed to wildlife conservation, was thriving on it.

These Asians, Africans and South Americans live in countries with—and some manage—many of the world's most endangered species. They deserve to know the latest conservation techniques, and for ten weeks at Front Royal the Smithsonian was giving them the works.

The National Zoo kicked off this training program in 1981, bringing seven people from six Third World countries to Front Royal for six weeks of workshops, seminars and fieldwork. The program has grown since. This year's 21 participants were chosen from more than 50 applicants. The project is funded by contributions from several institutions. The Smithsonian provides living quarters and helps defray the cost of some airfares and the chicken.

At the Front Royal center, with its high, wide and certainly handsome mountain pasturage for zebras, onagers, European bison, Eld's deer, Père David's deer and other endangered creatures, the trainees have a vast outdoor lab. They hear classroom lectures at the conference center, then step out for fieldwork. Their orientation lecture, for example, defines conservation, its objectives and strategies. Then trainees go out in the field to practice the use of equipment—compass and range finder, binoculars and calipers, trap and tranquilizer, radiotelemetry and animal-marking devices.

Back in the classroom, in the seminar called Habitat Evaluation, participants study vegetation and learn how to interpret aerial photographs and Landsat images transmitted from space. Then they go out and identify plants, collect and preserve some and make up a profile of the vegetation of a specified area.

The courses continue this way, through Demography (finding the population density of a species, the age of its members and the ratio of males to females—that sort of thing); Behavioral Ecology

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(the diets and ranging patterns of animals, their social groupings and structures); and Reproduction, which I presume is more or less self-explanatory. Trainees also get instruction in such things as how to use a computer, what to do about wildlife problems in their own countries and how to manage endangered species in captivity.

On one of the last days of this year's course, I checked in with Dr. Tim Halverson, program officer, and joined the class of 1987 for a taste of fieldwork. The group came from 12 countries, mostly Asian, but a couple of Latin American and African nations were represented. The 4 women and 17 men had come to know each other well, as I realized when they gathered for their "class picture" that afternoon and wisecracked and mugged for the camera.

Pictures taken, we piled into two vans and creaked up the mountain road for the questionable delights of pellet counts at the Père David's deer enclosure. This is one of the indirect methods of animal censusing, a way of estimating deer density that requires paying attention to their droppings.

The Père David's herd, once the pitiful vestige of a near-extinct species from China, is now a sturdy and confident Front Royal population. The animals moved uneasily away as we debarked to examine a number of randomly staked-out circles, ten meters in diameter. I joined a group. Two participants began assiduously counting individual pellets (dry and unobtrusive, I was pleased to note), throwing them out of the circle to avoid counting them twice. They had reached 14 when Halverson stopped them. "Just the groupings," he said, "not the pellets themselves."

So we figured all 14 as Group One and continued to search. Someone came up with Group Two. And there, beside a slab of rock, was another cluster. "Aha!" I cried, getting into the swing of things, "Group Three!"

"Not so fast," Tim said. "They're of the same consistency and age, and only a meter away, so we should consider them part of Group Two. You see," he added quietly to me, "the deer . . . um . . . do it while they're walking. We have to bear that in mind." I realized that never before have I properly understood deer pellets.

With an apologetic wave to the deer, we jolted over a badly washed-out road to a hilltop barn where baled hay was

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stacked against a fence. Targets were affixed, two tranquilizer guns produced, and the class grew very quiet as Tim, sounding a little like a camp counselor, briefed them. Some would be using such guns when they got home and started working with large animals like elephants, which must be tranquilized before they can be approached. Introducing them to a breechloader with telescope sight, Tim told them to "Just lay the cross hairs on the bull's-eye." "The what?" asked one trainee from, I think, Egypt. Tim explained. The man nodded. "Bool's-eye," he murmured admiringly.

After target practice (not too many bull's-eyes), we rested in the shade of a tree while Tim described the difficulties of managing the Front Royal native white-tailed deer population. Free from the culling process of hunting, their numbers swell enormously. Tim explained that the main reason for concern is the meningeal worm that native deer often carry. This parasite travels up the deer's spinal column to its brain. It has no effect on the whitetails, but it can kill other ruminants. Postmortems on some oryx, Sable antelope and reindeer that died at Front Royal revealed the worm.

Members of Front Royal's seventh Wildlife Conservation and Management Training Program pose for 1987 class picture.

A newly designed electrical fence works fairly well in keeping the whitetails away from animal enclosures. It's slanted against the outsiders, giving a little jolt to those who graze under it. If a deer manages the awkward leap over it and becomes an insider, the slant allows the animal to easily jump out again.

Like a student in a cram session, I was shoved quickly through this small sampling of the program's topics and got an idea of the details of wildlife management that the regulars had been learning. Now they faced the task of putting to use what they had learned.

One of the seven members of the first class, 1981, is now deputy director of the Wildlife Institute of India. Another joined the World Wildlife Fund. One is

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going for a PhD at the University of Florida; another teaches at Mahidol University in Thailand.

Former Front Royal trainees are researching red howler monkeys in Venezuela, gray langurs in India and the Sumatran rhino in Malaysia. Two Malaysian "graduates" are research officers with their country's Department of Wildlife and National Parks. Most of the former trainees went on to further university degrees and to faculty jobs after leaving.

What of my new friends in the class of '87? I knew that the two Bhutanese were especially interested in the ten-camera trap line that Canadian biologist Paul Joslin demonstrated under sponsorship of the World Wildlife Fund. With this trip device, they could photograph and monitor the little-known nocturnal fauna of their own country. At the center, we caught only some raccoons and possums on the series of Polaroids. And a raccoon actually bit one of the cameras.

I learned that the man and woman from Thailand had given the first of a series of special trainee-prepared seminars on wildlife problems in their native countries, on flooding that occurred in a huge forest in Thailand. They would return home to cope with it—perhaps better after their training. I learned that the two women from Burma's Department of Forestry were to attend a training program in Maine, then take a National Park Service course at Harpers Ferry before going home to work in recently established protected areas.

Introducing the trainee from Ghana, Tim noted that he runs about one-fortieth of his nation—a huge wildlife preserve. He would return to deal with the problems of poaching by launching a public awareness campaign. The two Pakistanis, one a wildlife warden, one a deputy director of forestry, hope to work again with the Smithsonian in reintroducing endangered species. One of the Malaysians would pick up his job with his nation's Elephant Capture Unit.

Two of the three Chinese would return to their universities and teach the techniques of wildlife conservation. The Peruvian was after her bachelor's degree. The Sri Lankan would go for graduate work at the University of Houston. Some participants are becoming training instructors and will teach the course overseas. Dr. Mewa Singh, whom I met, took the Front Royal course in '85 and helped teach the class of '87. Next year he'll set up a course in India. A similar program is under way in Malaysia.

The program coordinator, Dr. Rasanayagam Rudran of the National Zoo, explained that the Smithsonian has already conducted its wildlife training program in seven countries, where all you need do is step out of the classroom to have theories of managing endangered animals instantly become reality. A dozen other countries have asked for similar programs, and Rudran sees the Front Royal trainees forming "a nucleus for training others abroad. I'm excited," he added, "that the training program has become so popular. We started with so few—seven people. Since then, we've trained more than 225 from 24 countries."

Tired and hungry after my day in the life of a trainee, I shared dinner with my group. No chicken. Instead: Malaysian meatballs (lots of spice), rice and a fine, garlicky salad. I don't know how my classmates liked it, but I made a pig of myself.

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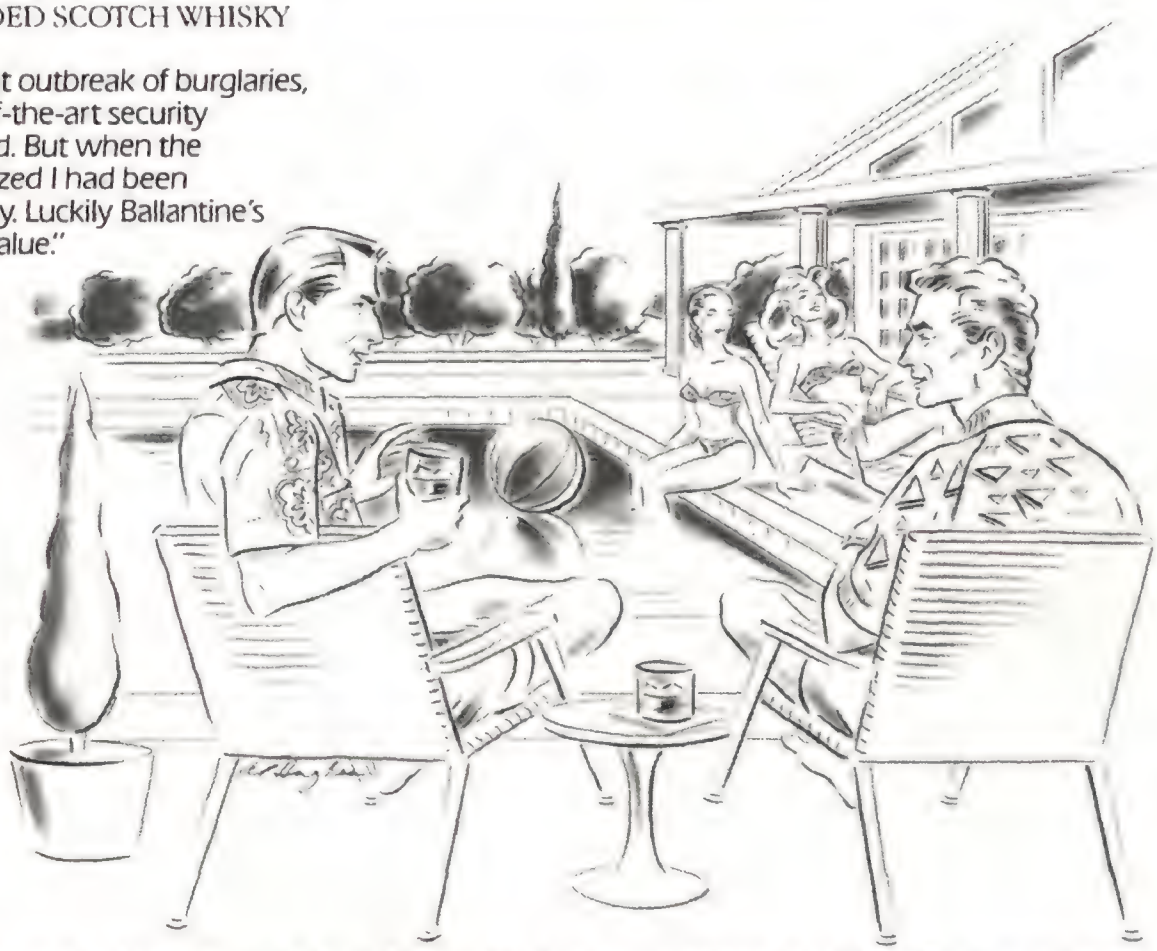

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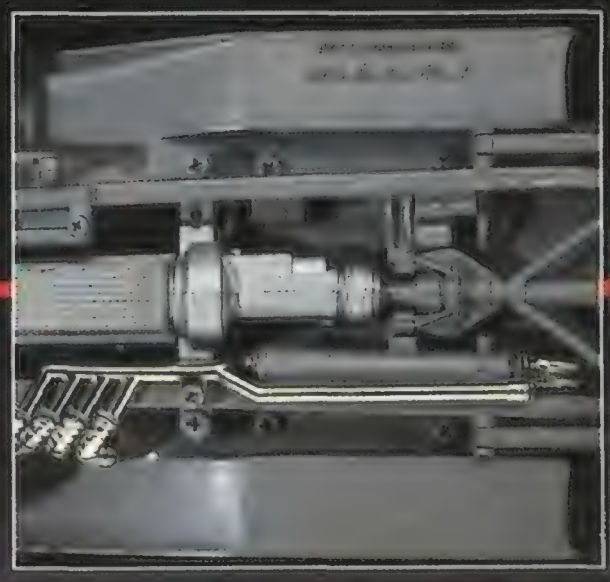

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A · M · I · E · L

New York Paris

Phenomena, comment and notes

Amateur telescope makers have come a long way, but the goal remains the same: a way to see the rest of the Universe

At first it looked like any other crowded campground: cars packed tightly and behind each a tent, everything from backpackers' lightweights to spacious homes for six with dining flies. Beneath beach umbrellas people cooked on portable stoves or sat reading in folding chairs. Toddlers stumbled about, dogs dozed in the sun. But this place was different. Behind nearly every tent stood a telescope. Some were clearly homemade, with square plywood tubes. Some were commercially made, with round tubes of gunmetal blue, industrial orange or white. Many were surprisingly large, looking very out of place in a rocky field on a hazy July afternoon.

SMITHSONIAN editor Don Moser and I had arrived at Breezy Hill, a place outside Springfield, Vermont, that has been hallowed ground for generations of amateur astronomers. On top of the hill is Stellafane, literally "shrine to the stars," the home base of the Springfield Telescope Makers (STM). It was here after World War I that Russell W. Porter and like-minded friends worked out the methods that made it feasible for amateurs to grind their own mirrors and make their own telescopes. We had come on the weekend of the new moon to attend the 52d annual Stellafane convention.

Perched atop the hill, the two-story clubhouse is West Indian pink with white wood trim. Carved into the trim along the roofline are the words: "The Heavens Declare the Glory of God." To the north is what looks like a concrete

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gun emplacement. In front there is a concrete hemisphere that turns on a circular steel track. Sticking out one side is a steel tower framework with a ring at the end to hold a mirror; next to the dome is a movable cell to hold a second mirror. This is the Porter Turret Telescope, built in 1930; the ingenious system of mirrors means the observer sits inside the dome protected from the elements. Scattered among the granite outcroppings around the turret are waist-high, steel-and-concrete pillars on which STM members mount their own telescopes when they come to Stellafane for a weekend of observing.

For the convention, the grounds are packed with homemade telescopes of every description and throngs of amateurs come to see what can be done. And what can be done in 1987 is amazing. When I was a boy, a junior member of the local astronomy club, the standard was a telescope with a primary, light-collecting mirror 6 inches across. A few daring souls attempted 8-inch mirrors, and one man had become a legend by constructing a 12-inch telescope. At this gathering, 6-inch telescopes were likely to be mounted as twins to be used as oversize binoculars. Fourteen-inch telescopes were everywhere, 18- and 21-inchers were scattered through the grounds, and one man from New York had brought a 30-inch reflector, a telescope larger than those at many college observatories.

A second revolution in amateur telescope making has taken place. The new breed of telescopes are called Dobsonians, named for a former monk who has devoted his life to showing people the Cosmos. John Dobson, now of San Francisco's Sidewalk Astronomers, reasoned that for sight-seeing in the heavens, a telescope need not have the equatorial mounting (in which one axis is precisely parallel with the Earth's axis) that commercial instruments have for precise tracking of stars. The glass for the mirrors need not be the very best (Dobson has used the glass disks from old ships' portholes for mirror blanks) nor, he decided, did it have to be as thick (to minimize distortion caused by sagging) as conventional wisdom had it. He started turning out big telescopes in far less time and for far less cost than anyone had thought possible, and began his true mission: to show people the stars. He has expanded his operation from Ghirardelli Square in San Francisco to the great national parks of the West; as many as 1,000 individuals a night look through his eyepieces.

Homemade Dobsonians were everywhere at the convention—in the clubhouse field waiting to be judged and in the camping fields just to be looked through. And John Dobson was there, an intense man with the physical flair of an actor, demonstrating brand-new ideas for making mirrors even faster and giving a talk Saturday night before the sky grew dark enough for the rush to the eyepieces to begin. Not everything was Dobsonian, however. There were elaborately mounted conventional reflectors and refractors, commercial comet hunters linked together to form giant binoculars, clock-driven mountings for conventional cameras, elaborately balanced arms to hold heavy binoculars steady for an observer on a chaise longue. One prizewinner was a computer-controlled polishing machine designed to handle the last step in mirror figuring; it took

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55. Shuffleboard, of course!
(There are lots more reasons, but we've just run out of room!)

the builders two and a half years to write the program before they started the machine itself.

I have never been a computer enthusiast, but at Stellafane it was impossible not to admire what they can do. The challenge when sight-seeing among the galaxies is to find them in the first place. With my commercial 6-inch, I had always done it the hard way, working from charts. To find a faint object, I would determine on the chart what the nearest bright object was and how many fields of view (through my telescope) and in what direction from it I had to move to find the faint object. Sometimes it was easy, but often I had to try over and over, hopping from guide object to target, and often enough I never found what I was looking for. (Then there was a certain variable star in the constellation Boötes, which I was to observe as my initiation into the American Association of Variable Star Observers. I never found it and almost did to my telescope what temperamental golfers sometimes do to their clubs.)

With computers no larger than car radios, today's amateurs solve the problem with the touch of a button. A man from Alabama had attached a compass and a vertical, graduated circle to his 20.5-inch Dobsonian. He would punch into his computer the time and the coordinates of the object he wanted, and the computer would tell him in what direction and how high to point his telescope. A congenial group from New Jersey with a large refractor had gone a step further. At the beginning of an evening all they did was sight their telescope on a bright reference star and tell the computer what it was. Then they simply punched in the code name of whatever object they wanted, and the telescope would turn to exactly the right spot in the sky.

Members of the Springfield club have some ambitious telescope plans of their own. One group is working on a 13-inch refractor with an ingenious optical design that eliminates the problem of different colors focusing at different points. And sitting in the president's house is a 27-inch mirror blank that will be the heart of a permanent observatory instrument. It is no accident that one of the premier telescope-making groups in the country is located in a Vermont city with a population of 10,000. John Martin, the current STM president, said that Springfield has been a center of precision-instrument making since the 1700s. The companies now there are closely connected to the aerospace industry. One firm, for example, made the machines that made the ball bearings for the arm on the space shuttle. Many of the members build precision instruments by day; in the evenings, they run small farms—and build telescopes. Yet this group that has been running a convention for more than 60 years (none was held during World War II) is small. The club presently has some 30 members, of whom, Martin says, only about 15 are active. Only five live within a 20-mile radius of the clubhouse, and of those, two are over 70.

To be eligible to join the club, you must have built a telescope—both optics and mounting. Martin describes it as more family than club, and to be a member you really have to care. Not only does the club run a convention every year, it has had to take on a major debt. The farmer who had always allowed conventioneers to camp in his fields now wants to plant the land in

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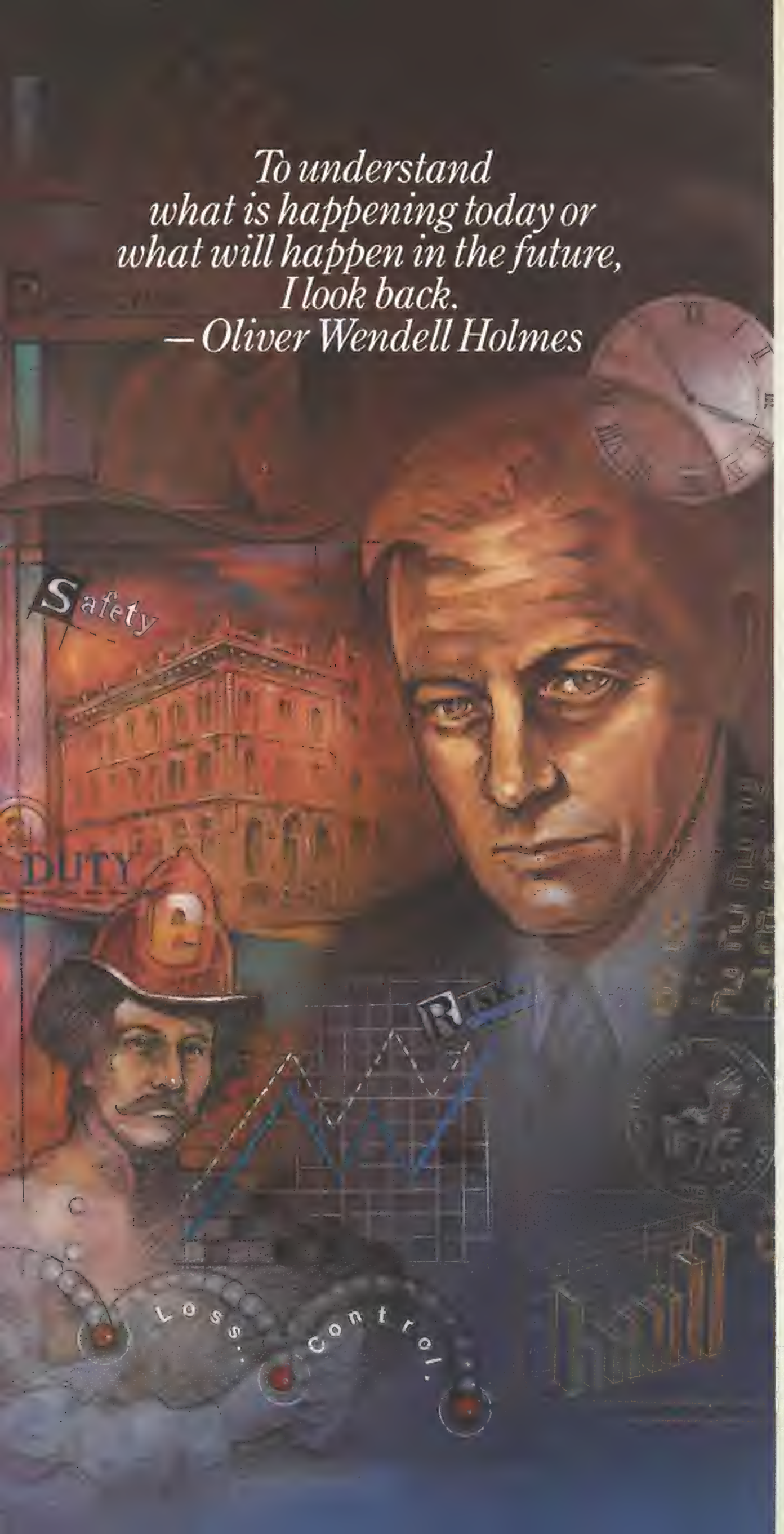
At Stellafane convention, a visitor looks under hood to see projected image of sun.

Christmas trees. So the club has bought 33 acres just down the road. When the banks said no to a mortgage, three of the members put up their own homes as collateral for a commercial loan.

In the meantime, members have been spending their weekends clearing the new land for campsites, using Martin's father's bulldozer for the heavy work. During the opening talks Friday night, Martin showed slides of a wooded area that is now the grassy field where Don and I pitched our tent.

The club has come a long way from the early days. Walter Scott Houston, who has conducted the deep-sky-observing page in *Sky & Telescope* since 1946 and for whom one of the camping fields is named, recalled an early meeting at which the big question was whether to buy a lock for the clubhouse.

The club gets lots of help from similar groups such as the Amateur Telescope Makers of Boston, some of whose members belong to both organizations. Typical of helping hands is Dennis di Cicco, an associate editor of *Sky & Telescope* in Cambridge and an accomplished astrophotographer, who has taken care of the registration for years. Di Cicco has been coming to the conventions since 1967, when he was 17. That year 350 people attended. This year about 2,500 came through the gate, but Di Cicco suspects that the number of actual telescope makers has stayed fairly constant. Many



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of the people who come now, he said, "would never, never think of making a telescope." They are strictly observers, who turn the convention into a star party.

That category includes me. I did start a telescope at the age of 14, but ended up with a Pyrex ashtray instead of a mirror. I made the mistake of following old instructions while using what was then a new method. When I stopped for the first test after the prescribed number of hours of grinding, I discovered I had scooped out so much glass that the resulting telescope would have been impractically short. I did take the unfinished mirror to a party, thinking that young ladies might be impressed with someone who could do even bad optical work, but they all seemed thoroughly underwhelmed.

On Saturday night, after a day and a half of looking *at* telescopes, everybody was ready to start looking *through* them. By 10 P.M. most of the sky was clear, with just a little haze. The star party was on. A tide of backyard astronomers washed over Breezy Hill, red-filtered flashlights (to protect night vision) stabbing the dark. Teams of judges moved through the crowd, testing the competition telescopes on actual stars. (Optical excellence is not a foregone conclusion. One panelist at an afternoon session said that in some years, three-quarters of the entries suffer from poor optical alignment.) The rest of us moved diffidently, waiting in good-natured lines for our turn to look. We worked our way from reflector to refractor, from home-built to gleaming factory model.

Behind the clubhouse, the line for the 30-inch wound halfway around a good-sized field, so Don and I retreated to the camping areas, also bristling with telescopes. There is something special about walking out of the night into the campsite of complete strangers, only to receive a friendly greeting and a word as to what the telescope was trained on: "The Dumbbell Nebula," "The Ring Nebula" or simply an astronomer's code, "M13" (a globular star cluster in Hercules). An appreciative comment or two was in order, and then we would walk off into the darkness again, carefully stepping over tent ropes, without ever even having exchanged names.

Finally it is 1:30 in the morning. Don and I have worked our way back to where our car is parked in a field, next to long rows of two-foot Christmas trees. Behind us red lights are clustered around telescopes; we can hear voices, a baby crying. It has been a long day, but we still have the fever. In the northeast, the Great Square of Pegasus has risen over the birches and behind it our sister galaxy in Andromeda. Don breaks out a small, portable telescope. To my eye the galaxy is unresolved brightness, a gathering of crystal light. It is nothing like the photographs in the books, taken with huge telescopes in long time exposures. But this is real, in real time. It is the difference between being in the same room hearing live music or just listening to a record. The photons striking our eyes have come two million light-years across intergalactic space and we are seeing them as they arrive.

Even at this hour it is a letdown to get in the car and, once away from Breezy Hill, turn on the headlights. Instantly our world shrinks from the whole Universe to a few hundred feet of dirt road. Our eyes can see no farther now, but our minds linger among the galaxies.

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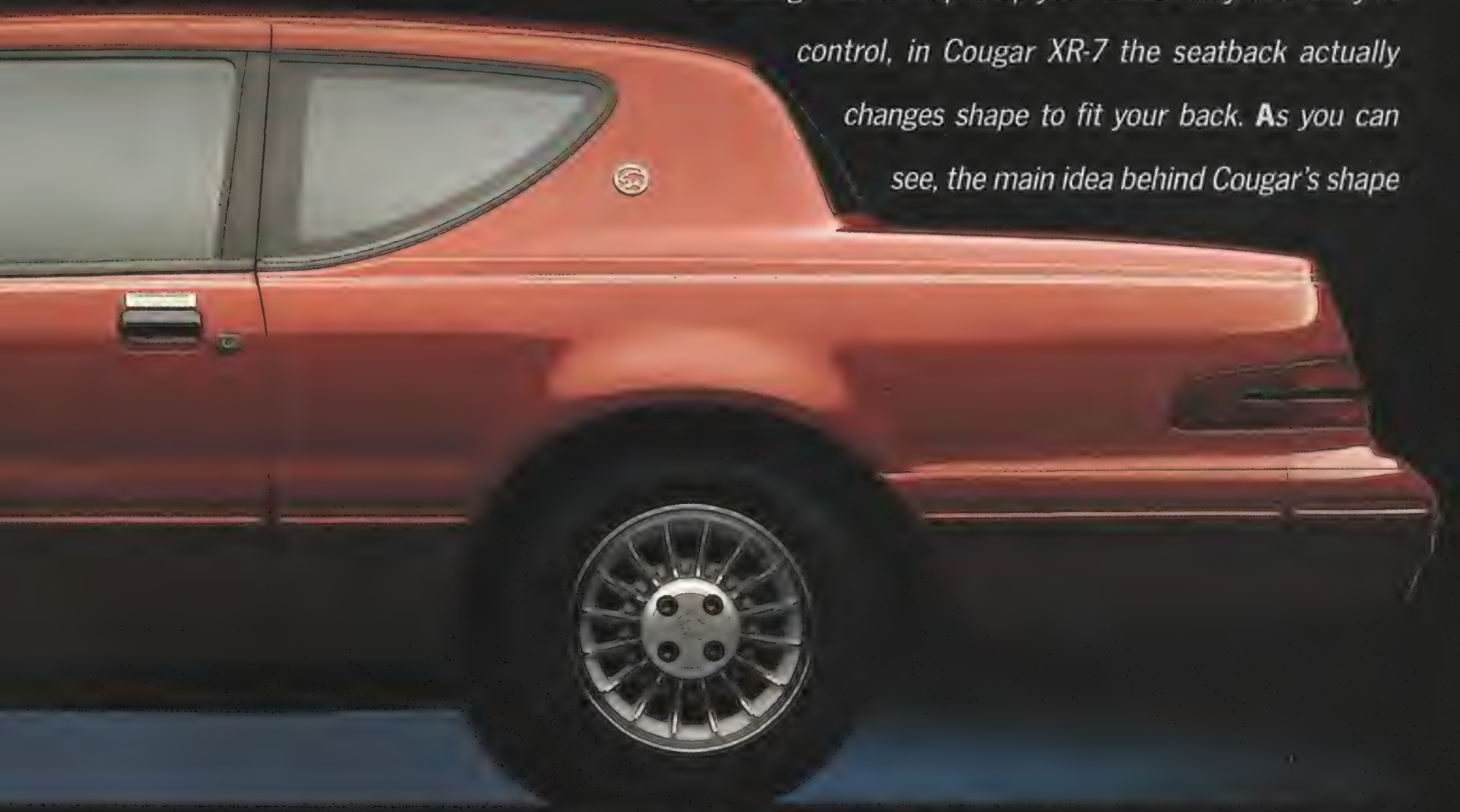

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GIRL SCOUTS

By Jane Howard

For Juliette Gordon Low's girls, a sparkling Diamond Jubilee

Despite early chauvinists' dire prophecies of 'a race of tomboys,' the Girl Scouts have excelled in leadership, caring, proficiency

Vanguard of 32,000 Scouts forms in Chicago for march down Michigan Avenue to Grant Park singing rally.

We smell of candy but we don't look sweet. We look gross, the Girl Scouts tell us, and so we ought, in the wake of a mock tornado. Two hundred of us volunteers are sprawled around Camp Ken-Jockety in northwest Ohio, ingeniously smeared with a paste, called a moulage, of cocoa butter, burnt marshmallows, red food coloring and mortician's wax. Here at the Seal of Ohio Girl Scout Council, in the 75th anniversary year of the Girl Scouts of the United States of America, it is Emergency Preparedness for Youth weekend and we have come to help the Scouts determine how much they have learned about treating gory injuries.

Even the most hideous of our simulated wounds should not faze these girls, who have had at least four weeks of training not only in first aid and CPR but in childbirth ("It might keep them innocent a little longer to see how unglamorous it is," one leader says), in home care ("If they have to take care of their old parents, they might as well know about bedsores") and in triage, to spot victims who most urgently need help.

I can't recall anything so dramatic, or so useful, in my own days, four decades ago, as a member of Troop 8 in Winnetka, Illinois. In our moss green, one-piece uniforms we were a lackluster lot, carrying the flag to the village green on Memorial Day, braiding plastic lanyards from which to dangle whistles and, apart from heeding a day camp swimming counselor nicknamed Splash, doing very little to make waves.

Being fit was always important; in St. Louis in 1987 aerobics has taken its place among traditional sports.

The ritual then was to join the Brownies at 7 or 8, next "fly up" to Intermediate ranks and then, if we chose, proceed to Senior Scouts. "Between the ages of eight and nine," an early Scout handbook decreed, "seems to be the right time to get hold of the girl when the seeds of character may begin to sprout into pliant tendrils ready to trail off in the wrong direction, but easily taken in hand at the time and trained aright." By 1984, the entry age was lowered to 5, more because of the numbers of working mothers and latchkey children than from any change in the pliancy of tendrils. "Besides," says Betty F. Pilsbury, the organization's president, "kids mature so much earlier than they used to—there's so much knowledge at a younger level." In any case, kindergartners now may join the Daisies; first- through third-graders may become Brownies; third- through sixth-graders, Juniors; sixth- through

In Ohio, volunteer "tornado victims" await Cadettes' ministrations, mastered during 25 hours' training.

ninth-graders, Cadettes; high school girls, Seniors.

My Troop 8 friends had names like Catherine, Sylvia, Janet, Carolyn and Barbara Jean. Here at Camp Ken-Jockety, and in other groups I visit to get a sampling of how Scouting has changed, I tend to meet Jennifers, Stacys, Tracys, Megans, Dawns, Mistys, the occasional anachronistic Louise or Katy, the startling Tiffani, Autumn, Chinue, and a Dreama, who confided that she wished she'd been named Kristi or Angela.

Names change, uniforms change—from dark blue in 1912 to khaki as of 1914 to various shades of green in 1928 and now, this fall, after a market research survey, to blue again for Daisies and Senior Scouts. In 1987 the GSUSA is very much given to market research surveys and Harvard Business School seminars in corporate management. It has three new national field centers, and bilingual publications with a lot of talk, in the English versions anyway, of "input" and "mainstream" (as a verb). But Scouts still assemble in troops, of which the nation has 174,000, divided into 335 councils, and they work, as Scouts ever have, for badges.

Badges, once given for Beekeeping and Parlourmaid, are now also awarded for Computer Fun, Aerospace and Business-Wise. Any troops that want to, may invent their own. Alene Tanner, who for nine years ending in 1966 led a troop of 14 girls in Red Cloud, Nebraska, decided it was too bad her Scouts had read nothing by their town's most celebrated author—and devised a Willa Cather badge. To win it the Scouts had to read and report on one Cather novel, spend ten hours rebuilding the Cather museum, meet seven other requirements, and finally design and embroider their own badge, a gold plow on a green background.

Now programs are offered called Safe & Sound at Home Alone, Say NO To Drugs, Staying Safe (dealing with child abuse) and Growing Up Female. Teenage suicide gets talked about, too. The Girl Scout Promise and Laws have also been modified: Girl Scouts now do not vow to be a "friend to animals" but "to protect and improve the world around me." Certain things, however, remain constant. Scouts still eat "s'mores" (melted chocolate bars and marshmallows on a field of graham crackers), still sing "Peace I ask of thee, O River," "The Ash Grove" and "Kookaburra sits on an old gum tree," and they still giggle.

There's no giggling today at Camp Ken-Jockety, though. Not yet, anyway. This is serious. In our pockets we volunteers have scraps of bright red cloth to display in case something truly harmful should befall us in the course of treatment by the Scouts, who will be along any minute. Just before they appear on the

The author, whose articles often appear in these pages, is at work on her fifth book, Lost in the Interior, *about the Middle West past and present.*

scene, a leader checks us over. "Look more mangled," she says when she comes to me. I scrunch into a more grotesque position and wait for help.

But for one detail, this tableau would gladden the heart of Juliette Gordon Low, who, on March 12, 1912, founded the Girl Scouts in the United States of America. There aren't any uniforms in sight. Today's Girl Scout leaders have uniforms designed by Bill Blass. The girls tend to leave their official uniforms home, if they choose to own them at all, and show up in pretty much any old combination of jeans or shorts and T-shirts. If there was one thing "Daisy" Low doted on even more than she doted on a mix of girls, crises and preparedness, it was uniforms. Her own, as president, had a fourragère of gold braid and a big hat and a leather belt to which were attached a Scout knife, a whistle and a tin cup.

Some of her contemporaries wore such getups because they thought they were supposed to, feeling maybe a little silly—but not Daisy Low. She put on all these things, one friend reported, "because *she loved to wear them!* The uniform gave Daisy a sense of identification with her adored father and the many fine men, close friends of hers, who were fighting across the sea." Second of six children of a Confederate war hero, Juliette charged ahead from an early age. At 8 she saved a small child from drowning and years later, as a houseguest in a Scottish castle, shot a stag she had stalked for seven hours in the rain.

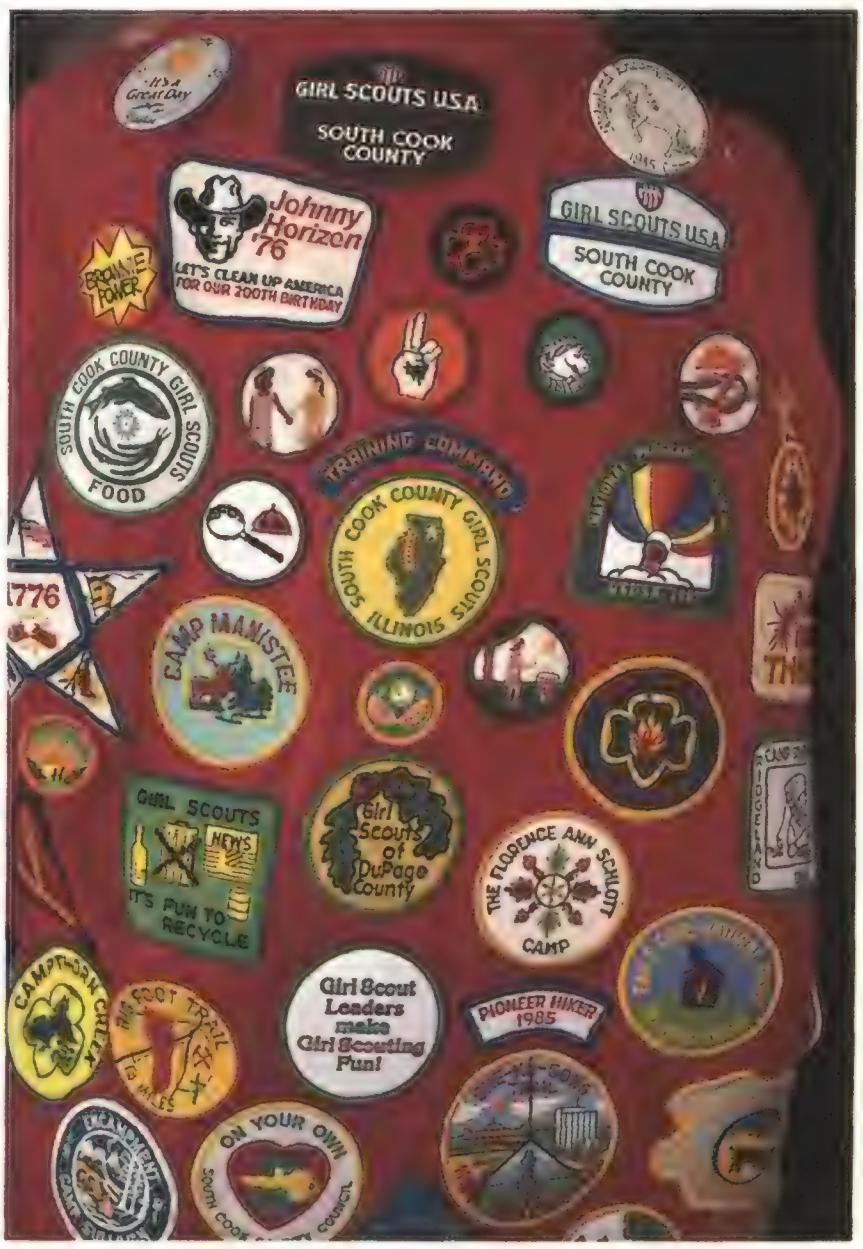
Although odd, undeniably a lady

In her time Daisy had also out-argued Winston Churchill and learned to cope with deafness, childlessness, a humiliating marriage and, at age 45, divorce, which caused a brother to worry about "her dubious status as neither maid, wife, nor widow." For all her wealth, social position and background, she felt undefined and unfocused, as she confessed to an English friend, Sir Robert Baden-Powell, founder of the Boy Scouts (SMITHSONIAN, July 1985).

Baden-Powell's sister Agnes in 1910 had founded the Girl Guides, also in England, as an adjunct to his Boy Scouts, and Daisy Low decided her mission was to expand this sisterhood to the United States. "I've got something for the girls of Savannah, and all America, and all the world," she accordingly announced, in March 1912, "and we're going to start it tonight." Eighteen daughters of old Savannah families were allowed to sign up, however skeptical their parents may have been, because "though Daisy might be odd in some ways, she was a Gordon, and undeniably a lady."

Baden-Powell wished that Daisy would call these girls Guides, like their English counterparts, instead of Scouts. Applied to females, the word Scout seemed

Seal of Ohio anniversary celebration included display of equipment of the future, including a Mylar tent.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Girl Scouts of DuPage County
THE FLORENCE ANN SCHLOTT CAMP
Girl Scout Leaders make Girl Scouting Fun!
PIONEER HIKER 1985
ON YOUR OWN

Collected over 15 years, 40 emblems adorn jacket of Troop Leader Diane Helander from Chicago Ridge.

Fitness in the early days meant outdoor calisthenics, with Scouts dolled up in middy blouses and bloomers.

Gaze steady but kindly, wearing her beloved uniform, Juliette Low sat for her last portrait, around 1926.

to him and other male leaders tantamount to producing "a race of tomboys, than which there is nothing more objectionable."

Daisy Low, who came from a long line of unabashed and womanly tomboys, ignored all that—being hard of hearing may have had its advantages—and got on with her mission, which grew fast and encompassed everybody. Elitism was no more countenanced in Girl Scouting, nor is it today, than surliness or sloth. Girl Scouts were, and are, not only cheerful and enterprising, but friends to all and sisters to every Girl Scout.

In a 1919 foreword to the *Girl Scout Handbook*, "B-P," as Daisy sometimes referred to her mentor, praised the "pluck" of American women in the face of the "cunning of the Red Man." Daisy Low's offshoot of his Scouts had a more generous view of humanity: in 1930, a Girl Scout troop in Pawnee, Oklahoma, consisted entirely of native Americans.

Early annual reports of Girl Scouting are more entertaining than glossy recent publications. In 1923, every troop took at least one hike a month and found "zest in cooking, dusting, cleaning silver, making beds, laundry work and many other homey tasks." In a 1925 rumination on the ideal hope chest, the report ventures: "How merry and sparkling a sense of humor would look lying in the chest beside great grandmother's coral beads!"

"In these days when our new industrial civilization has not yet made its peace with human nature," said the 1928 report, "Girl Scout camps provide relief from bleak factory districts, decaying rural neighborhoods, drab towns and . . . over-sophisticated city homes."

A decade earlier, at one board meeting, Mrs. Low had unsophisticatedly modeled newly designed Scout shoes by standing on her head. Fellow board members sometimes found her not so much lovable as exasperating. In 1918 one complained that "You cannot realize the nervous strain under which the ordinary mortal labors in trying to work with you. Your mind is brilliant and you are full of imagination, but you make it impossible to concentrate . . . I cannot tell you how I long to get out of this whole hateful mess."

But the "hateful mess" survived its founder's shortcomings and continuous opposition from males. The Camp Fire Girls had been founded in 1910 with Boy Scouts of America encouragement, and Juliette perhaps overstated when, in 1920, she wrote: "The heads of Boy Scouts have for eight years done their best to crush us, and we can afford to ignore them, what we must do is to get every man of note in *this country* behind us." It was quite true that many top men in Boy Scouting were, for some years, adamantly opposed to "Scouts" as applied to girls. BSA organized letter-writing campaigns and, in 1924, threatened suit over the name's use on products for sale, but never went to trial. James West, for many years BSA's chief executive, made speeches on the subject, and as late as 1941 held a press conference in which he blasted the Girl Scouts for using the name and thereby "aping men."

But Daisy rallied substantial support from such men as the husband of her good friend and staunch Girl Scout advocate, Lou Henry Hoover. And Boy Scout

leaders in the field were far more charitable than the national heads, giving the ladies generous support. So Daisy's Scouts prospered, and in 1940 membership for the first time included troops from institutions for the mentally handicapped and for the wayward. After World War II, a liaison began with the United Nations. The emphasis remained international in the '50s, and membership hit the all-time high of 3.9 million in 1969, only to decline in the following decade.

When the Women's Movement was reborn in the 1970s, the Scouts were prepared for it. Dr. Cecily Selby, then the national executive director, claimed that "Girl Scouting has been liberating American girls since 1912," and persuaded Betty Friedan, who had loved hiking with her Peoria, Illinois, troop in the 1930s, to join the national board. "The meetings were hatefully bureaucratized," says Friedan, "but it was important for me to be there, and I saw the Scouts really evolve into a new consciousness of personhood, really prepare girls for leadership, in a way that isn't patronizing, doesn't infantilize real commitment to quality, real reaching out to black and white."

Evidence of that commitment is everywhere. In Waukegan, Illinois, a roomful of black girls who are just getting acquainted play games and do exercises designed to meld them into a team for their "Wyoming Trek" to the Big Horn Mountains, where they will camp out, ride horseback and participate in nature studies. Part of their way they earn themselves; the rest is paid by the DeWitt Wallace Reader's Digest Scholarship Fund. In a Seymour, Indiana, church basement, a group of inattentive white girls gets lectured about drugs by a state trooper who resembles Robert Redford, calls himself the Care Bear and keeps addressing his audience as "You guys—I mean you gals." Girls today, to quote Betty Pilsbury, "face problems neither Mrs. Low nor anyone else could have foreseen."

In Bloomington, Indiana, a girl named Katy passes the time playing the piano with her toes until the arrival of her troopmate Louise, who is late because of a flying lesson. Louise, who in 1986 on a Wider Opportunity program took part in the Tall Ships parade celebrating the Statue of Liberty's centennial, this year went to Space Camp in Alabama and hopes to work toward a Gold Award by participating in a prison reading program for illiterates.

Girl Scouting, it is clear, has in its 75 years become one of this society's major sororities. Among the alumnae are Congresswoman Pat Schroeder, U.S. Supreme Court Justice Sandra Day O'Connor, actress Helen Hayes, Senator Barbara Mikulski, Secretary of Transportation Elizabeth Dole, skater Peggy Fleming, the Johnson and Nixon daughters, Joan Mondale and columnists Erma Bombeck and Dr. Joyce Brothers.

It's hard to generalize about the 52 million women whose lives this movement claims to have touched: their non-Scouting interests range from politics to business, sports to the arts, from karate to bird band-

In early 1930s, as now, civic projects engaged Girl Scouts; here, they are building a road for their camp.

Who could resist these 1950s winsome smiles? Today, Scouts' cookie sales still augment council coffers.

Concentration, aim and muscle direct Teresa Gose's arrow toward bull's-eye at Ken-Jockety archery range.

Juniors December Dowler and Stori Snyder rest from wood gathering at Indiana's Camp Wapi-Kamigi.

Lest they forget: Evie Bower portrays Juliette Low in Girl Scout history play at a day camp in Ohio.

Waving caps, Junior Girl Scouts saunter along woodsy road on their way back from swimming pool.

ing to lattice-topped rhubarb pies. Some find Scouting a touch too wholesome, with what might be called an irony deficiency, but to others it offers ties as compelling and as lasting as those of blood, and an integrity and professionalism not regularly found elsewhere.

"Many women I have interviewed over ten years have told me that Girl Scout volunteer work was the equivalent of graduate school," says Prof. Mary Rothschild of Arizona State University, who is at work on a history of the movement. "They don't know how bright and able they are," Cecily Selby, now a full professor of science education at New York University, adds. "The deeper you dig the more quality you'll find. To run the smallest Girl Scout council is to know how to handle budgets of thousands of dollars a year. I can't tell you how many committee meetings I've been to—where I wished the leaders had had Girl Scout training."

In 1983 the mortgage was burned for GSUSA's 13-story headquarters on Third Avenue in New York City, which the organization built in 1957. The Scouts now are the world's largest voluntary organization for girls, with an enrollment of nearly three million, of

At Ohio camp there's a pond for canoeing, fishing. Activities also include volleyball and square dancing.

whom 2.25 million are girls and 669,000 are adult members. Annual dues are $4, and additional monies are earned from the royalties on sales of cookies—138,471,797 boxes were sold in 1986, for about $2 each.

Just before the Scouts come to rescue us mock tornado victims at Camp Ken-Jockety, the leader of the exercise calls, "Let us hear you moan!" We moan. "I can't hear you; what about a scream?" We scream. "Are you in a lot of pain?" We yell that we are. "Are we going to cure you?" Well, they're going to try.

Kari Hoblitzell, as it turned out, was the 13-year-old Cadette who came upon me and treated my simulated wounds. "I didn't tell you you'd be all right," Kari told me later, "because maybe you wouldn't. I gave you my name and told you 'I'm doing the best I can.' I bandaged your hand and your head, checked your arms and legs for fractures, and went to get medical help." So she had, after carefully rolling me onto a stretcher borne by eight of her teammates, none of whom, she first made sure, suffered any back or knee injuries.

In a real emergency, perish forbid, one could do a lot worse than to be rescued by Kari, who used to want

Junior (about to be Cadette) Stephanie Mahoney, 12, flops on her cot to read a letter from a friend.

At Ken-Jockety, Junior Scouts await signal to sing "Happy Birthday" and blow out anniversary candles.

Girls earn badge for studying aquatic life at Darby Creek preservation site, Ohio; here, examining snails.

to be a nurse but now thinks that maybe, like four other girls in her council who have been through Emergency Preparedness, she'll become a physician. Louise and Katy would be reassuring rescuers, too, adding humor to solicitude, as would Chinue and Keisha, who went in the van from Waukegan to Wyoming.

The 75th anniversary year was launched with a Promise Circle at Washington's Kennedy Center at 4 P.M. on March 12, the Scouts' official birthday. There and then the newest version of the Girl Scout Promise was recited by a group of 2,000 including former Scout Nancy Reagan, and later repeated as 4 o'clock fell in other time zones all through Scoutdom. More fanfare followed. In April a parade of 32,000 Scouts from five states marched down Michigan Avenue in Chicago. In June, 13,000 Scouts celebrated the Diamond Jubilee during an outdoor weekend near San Bernardino, California, applauding tributes to them by such big-name entertainers as Donny Osmond and Burl Ives. With the approach of Halloween, the singularly appropriate birthday of Juliette Low, the festivities will continue. There will be "gifts of service" in communities throughout the country—such as collecting food for the hungry, helping the elderly, raising funds for tree plantings.

A couple of months after the mock tornado I went back to Camp Ken-Jockety, where a week-long day camp was just ending, to see how Kari and her fellow Scouts were doing. A tentful of 9-year-olds who had spent the afternoon swatting mosquitoes, singing a song about calamine lotion, and "creeking" (collecting snails, insects and water samples from Big Darby Creek for the research files of the Ohio Department of Natural Resources) were making s'mores over a campfire and clamoring for their patrol's program aide, Kari, whom they playfully called Mommy, to give piggyback rides.

This was a classic Girl Scout scene. I wished I could also take part in an overnight excursion one inner-city troop has talked of making, either to a shopping mall or a skating rink. And I'm glad about the chant I had heard at an African Folklore Adventure performance, on my earlier trip to Seal of Ohio, about "Respect, Understanding and Love." The chanter was Jubal Harris, a gifted poet and musician, and the audience was enthralled. Carr'mel White and Latanya Muhammad, the Scout officials who had organized this event, beamed when they saw how racially mixed the audience was. "We've done a lot of networking to get community involvement," said White.

Girl Scouting, in its 75th year, abounds with agendas. "Tradition with a Future" is the anniversary's rather ambiguous motto and there is much talk of how Scouting might change in the 25 years between now and its centennial. One change the future won't bring is coeducation. Unlike the Camp Fire Girls, whose name in 1979 officially became Camp Fire Inc. and of whose 415,000 members 35 percent are male, the Girl Scouts plan to keep their identity. In Troop 8 we sang about "Winding the old trails, rocky and long"; Kari and Chinue and Louise and Dreama will blaze new trails as well as winding old ones, through inner cities as well as up mountains. Like all other organisms, as Cecily Selby says, Girl Scouts must either adapt or become vestigial, and never mind if anyone calls them part- or full-time goody-goodies. "Scouting," as one leader puts it, "offers a safe place to take chances. It's self-esteem that matters, not squeaky clean."

African storyteller Jubal Harris spellbinds young Scouts with ethnic tales, dances, puppets, then food.

And so ends a Brownies' perfect day at camp, with long, green sticks, a glowing fire, marshmallows.

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Metropolitan Museum of Art

Demuth's reverberating *I Saw the Figure Five in Gold* is from series of symbolic portraits of American artists. Here, he paid tribute to poet William Carlos Williams' clangorous poem, "The Great Figure."

By Andrea O. Dean

He was an acrobat on the leading edge of Jazz Age art

Hedonistic and often debauched, Charles Demuth was nonetheless a pioneer Modernist who's now being paid the attention he's due

National Gallery of Art

Stieglitz made this portrait of him and Demuth called it "one of the most beautiful things" he had seen.

Gertrude Stein recalled in the *Autobiography of Alice B. Toklas* that "sure enough after all these years, someone left at the rue de Fleurus during our absence a little picture with a message that this was the picture that Demuth was ready to give to Gertrude Stein. It is a remarkable little landscape in which the roofs and windows are so subtle that they are as mysterious and as alive as the roofs and windows of Hawthorne or Henry James."

Fellow painter Marsden Hartley recalled how, in the summer of 1915, "Charles liked being in on these parties, those tiger-like stalkings after amusement down the courses of the night, he liked being swept into atmospheres and getting his own funny kick out of them, and they were big ideas and issues for Charles, bringing some of the best of his work out of him, and I am sure he gave them far-reaching importance by virtue of the fact that his imagination was essentially of the spiral variety."

The man they were remembering was Charles Demuth, perhaps the most intriguing artist to emerge during the heady Jazz Age. A pioneer Modernist during the late 1910s and the '20s, he allied himself with the most radical trends in Paris and became a regular at Gertrude Stein's salon, along with Hemingway, Picasso, Braque, Juan Gris. He helped bring Cubism to New York, where he was for 20 years a devotee of vanguard photographer Alfred Stieglitz, proselytizer of early Modernism. Through his gallery "291," publications and personality, Stieglitz shepherded a generation of avant-garde artists toward recognition. Among them, Marsden Hartley, Georgia O'Keeffe and Marcel Duchamp (who called Demuth "one of the few artists whom all other artists liked . . . a rare case indeed") were Demuth's close friends, as were poet William Carlos Williams, anarchist John Reed, playwright Eugene O'Neill.

Demuth's art was as rich and varied as his friendships. Like him, it was complex and eccentric, gentle and romantic, but veiled with sinister overtones. It included delicate but darkly suggestive floral watercolors, as well as anecdotal, wit-and-sex-laden watercolors that did for New York's Jazz Age nightlife what Toulouse-Lautrec had done for Paris' lowlife in the 1890s. As Demuth admitted, "I love Broadway and—well, and vulgarity, and gin." He also painted floating, iridescent landscapes with fine fluid lines and originated Precisionism to create cool, Cubist cityscapes in tempera and oil. Demuth's emotion-laden illustrations for books by Emile Zola, Henry James and others are regarded as the best of their genre, and his portraits of Williams, Hartley, O'Keeffe and John Marin influenced 1960s Pop Art.

Yet Demuth remains largely unappreciated. Critics of past decades tended to ignore art like his that

Museum of Fine Arts, Boston

Influenced by French Cubists, Demuth painted *Sailboats and Roofs* in his delicate way in 1918.

ranged too broadly to be pigeonholed, and to view psychologically charged, pictorial images as retrograde and somehow vulgar; they saw watercolor as a minor medium and delicacy and refinement as weaknesses. As Demuth predicted, "Lightness is seldom understood and never forgiven."

Fortunately, ideas have changed. The Whitney Museum of American Art is holding the first retrospective since 1950 of Demuth's work. Opening on October 15, it runs through January 17, 1988. An excellent catalog by curator Barbara Haskell documents the show.

Demuth was born in 1883, in staid Lancaster, Pennsylvania. Being an only and indulged child of successful business people left him financially secure, though never wealthy, all his life. He was always socially at ease, if somewhat aimless and frivolous. As Duchamp remarked, "It was fun to be with Demuth because he didn't care where he belonged or was in the social scale." He described Demuth as having "a giggle that sounded like the whinny of a horse" and "kind of a drawn face with piercing eyes. And a wonderful sense of humor. . . . He was very sweet."

But Demuth was also secretive, inverted, hedonistic and often debauched, a snob, a dandy and vain enough to call Stieglitz's famous photoportrait of him "one of the most beautiful things that I have ever known in the world of art." A great deal is explained by Demuth's lameness since childhood from Perthes' disease (accounting for his decision to paint mostly small, easy-to-move watercolors), his later illness with diabetes and his homosexuality. Demuth saw himself as a perennial outsider.

As a student, first at Philadelphia's Drexel Institute (1903-05), then at the Pennsylvania Academy of Fine Arts, Demuth met his future patron Albert Barnes, the famed collector of modern art, as well as William Carlos Williams. The poet later wrote, "I met Charles Demuth over a dish of prunes at Mrs. Chain's boarding-house on Locust Street and formed a lifelong friendship on the spot with dear Charlie."

Like most of his art-student friends, Demuth was strongly influenced by the Ashcan School of realism. But he cultivated a contradictory and lasting personal style of 1890s world-weariness, decadence and detachment—what Duchamp called "his curtain of mental privacy"—and the conviction that art has no social, moral or political purposes. "By capitalizing on his physical exoticism—olive skin, raven-black eyes, thick, glossy hair," writes Barbara Haskell, "he projected an image of originality and distinction that fellow students at the Pennsylvania Academy took for genius. He was the quintessential dandy, fastidious in dress and detached in manner."

In the fall of 1907, he embarked on his first of three visits to Paris. "It was no accident that Demuth got to Paris," wrote Emily Farnham, an earlier biographer. "It was his nature to be where things were happening, to scent out and ally himself with what was exciting, what was new." The event of his sojourn was the Salon d'Automne, which opened the month he arrived and reflected the frenzy engulfing the French art world as Cubism emerged from Fauvism. Though seven years away from discovering his own way of painting, Demuth was already probing for an intuitive yet analytical and universal style, and this visit set the stage for his later break with realism.

That break was hastened, after Demuth's return to Philadelphia in the spring of 1908, by frequent visits to New York where he must have seen Stieglitz's "Younger American Painters" exhibition at the 291 gallery in 1910. Arthur Dove, Marin, Hartley, Alfred Maurer, Edward Steichen and Max Weber were all represented. Demuth undoubtedly also saw Stieglitz's

The author, executive editor of Architecture, *wrote on architect Kevin Roche in August 1982 and sculptor Richard Lippold in February 1983.*

1911 shows of Cézanne and Marin watercolors, for by 1912, when he finished his studies at age 29, Demuth's work showed Modernist tendencies.

After he left the academy of art at Philadelphia in 1910, Demuth's home would always be his mother's house in Lancaster, though for years he divided his time between Lancaster and New York and periodically went abroad. During a second trip to Europe, from December 1912 until the spring of 1914, Demuth met Marsden Hartley, who drew the younger artist into both Parisian and German art circles.

Among the scores of artists in Paris were Braque and Picasso, both just 31, doing collage and about to commence the period of Cubist synthesis. Progressive writers and painters met at Left Bank cafés, while Gertrude Stein ("looking like some oriental god, with the young and faithful kneeling at her feet," as one observer described her) introduced Americans to the European vanguard. Demuth soaked it all up, felt at home and earned a reputation for being a *débauché* and ruining his health. His artistic maturation was slow, possibly because he spent much of his time writing, mostly plays.

The America to which Demuth returned in 1914—the year of his first one-man exhibition and the beginning of his five most prolific working years—was one of enormous ferment. These were years, as author Max Eastman observed, when "there was a sense of universal revolt and regeneration, of the just-before-dawn of a new day in American art and literature and living-of-life as well as politics." The 1913 Armory Show had given New York its first introduction to modern European and American artists, dubbed the "lunatic fringe" by Theodore Roosevelt. It marked the beginning of New York's ascendance as art capital of the Western world. Demuth missed the exhibit, but threw

Both: Museum of Modern Art

Painter's love of nightlife embraced vaudeville and the circus as shown in 1919 watercolor *Acrobats*...

...and *Vaudeville Musicians*, 1917. Their color and excitement were to Demuth "really our stuff."

Marion Koogler McNay Art Museum, San Antonio

Artist did series of watercolor still lifes composed of fruits and vegetables; here, *Kitchen Garden*, 1925.

Mr. and Mrs. Bernard Heineman jr.

himself into its wake—bohemian New York and Provincetown, Massachusetts, both of which attracted French artists like Duchamp, who had fled World War I Europe. Demuth established friendships with the collector Walter Arensberg (the closest thing New York had to a Gertrude Stein), with Eugene O'Neill, painter Stuart Davis and John Reed, writer for the radical magazine *The Masses*. Demuth helped found the Provincetown Players, welcomed the ascendancy of Freud as justification for sexual permissiveness, drank a lot and made late-night forays to Harlem nightclubs with Marcel Duchamp.

The one-man show that launched Demuth's career as an inventive modern artist in the fall of 1914 consisted of 25 watercolors of the dunes and bay at Provincetown. It revealed the artist's brilliant use of color as a vehicle of mood and emotion and was received as the "very best fruition of the new movement," one critic wrote. "His work has the strictly modern 'color music' note without any of the grotesqueness which some of the moderns have given it." The exhibit took place at Charles Daniel's gallery, the only one other than Stieglitz's that showed progressive artists; Demuth would remain with it until it closed in 1929.

Though Stieglitz met Demuth in 1914 and was his adviser ever after, he didn't show the painter's work until 1925. Stieglitz seems to have been ambivalent about Demuth's subtle, psychology-imbued art and was committed to John Marin, another superb watercolorist. Demuth's exclusion from gallery 291 and the cloistering of much of his best work in private collections help explain the artist's lack of fame even in his own day.

In 1915 Demuth turned his attention to anthropomorphic paintings of flowers in which, unlike the Provincetown landscapes, both figure and background advance to the picture's surface in animated, overall patterns. Several critics have likened their melan-

Private collection

In 1915 Demuth began to do highly charged floral images in watercolor. He painted *Flowers* in 1916.

His watercolor *Kiss Me Over the Fence*, 1929, used white space of paper to produce ethereal delicacy.

choly, dark mood to Baudelaire's great poetic cycle, *Les Fleurs du Mal*.

Also in 1915, Demuth began his series of watercolors of vaudeville and the circus, subjects that appealed to him for being thoroughly American and embodying the gap between outward glitter and inner sadness—a gap he knew well. In illustrations for Frank Wedekind's Lulu plays, three years later, Demuth included words bubbling from characters' heads, an effort to narrow the distance between writing and art. In them, as in his paintings, he used a Fauve color palette and pulsing rhythms, evoking "intimacy and perfumed decadence," in Barbara Haskell's words. A preoccupation with sex is central also in Demuth's later illustrations for Balzac's *Human Comedy* and books by Henry James, an author with whom Demuth felt a special kinship. Like Demuth, James had a fastidious personal style, a wish to meld art and literature, and no lasting, sexually intimate relationships.

Demuth is credited with having originated Precisionism, a rendering of Machine Age subjects with precise, abstract, planar images and smooth, unmodulated color. Beginning in 1922, it found mature expression in his architectural paintings. In Demuth's attempt to pull together an indigenous American experience—the new god: science and industry—they reflected a widespread, cultural nationalism. It was a loyalty spawned by expatriate artists who came home after World War I believing, as Malcolm Cowley wrote in *Exile's Return*, that "America is just as Goddamned good as Europe" and by French artists in New York who, disillusioned with Europe, proclaimed America the new great hope. In 1921, for example, when Demuth told Duchamp that he felt nostalgic for Paris, the French artist answered, "Oh! Paris. New York is the place—there are the modern ideas—Europe is finished."

In their search for America's soul, many American

Thyssen-Bornemisza Collection, Lugano

Among the artist's most austere work is *Design for a Broadway Poster*, exhibited in 1929 at the Stieglitz gallery. It was his last tribute to the theatrical life he loved and pointed the way for art to come.

artists looked toward New York's skyscrapers and adopted Precisionism, though it became so amorphous as to include every industrial theme reduced to geometric shapes. Demuth, however, found his country's heart in his home city of Lancaster, which embodied not just science and industry, but also a sense of tradition that was central for Demuth all of his life.

There was another, more pressing reason for his return to Lancaster. Demuth had been ailing since at least 1920, though he lived as if nothing were the matter. In fact, in 1921 at age 38, when he was emaciated and depressed, he decided to go to Europe again. Just a month after his departure, he was hospitalized in Paris and diagnosed as diabetic. Marsden Hartley, who was there, wrote, "The disheartening news has been revealed, he saying to me, and I recall it so well—O well, I've seen it all—I've done it all. . . . Charles learns that he is really ill." This was just at the time that insulin had been discovered.

Demuth returned to Lancaster, where he remained under his mother's supervision for most of the rest of his life. His friend William Carlos Williams visited shortly after Demuth's return from Europe and later wrote, "That, I think, was when I first saw his mother. She was a horse of a woman, a strange mother for such a wisp of a man." Demuth's diabetes was treated, at first, by reducing his caloric intake to near starvation, which prolonged his life until insulin therapy became available in the United States in 1922. The effect was miraculous. Demuth wrote Stieglitz,

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"The serum seems to be—well it seems like a sort of trick. I feel—I will wake—it is not possible." He tended, however, to neglect his regimen. Demuth was ill ever after, needing two daily insulin injections, suffering hypoglycemic attacks and diabetic coma. But, through it all, wrote gallery owner Daniel, "never a murmur about his condition. He would roll up his sleeve at the gallery, nonchalantly take a shot of insulin and be off." Demuth seemed to be as unperturbed as ever.

Among the most influential of his late works was Demuth's group of poster portraits of American artists. Intended as a tribute to American culture, they were not physical likenesses, but emblems conveying their subjects' psychological and artistic natures, through recognizable objects. In them, Demuth intentionally imitated advertising, the most typically American genre, and he used numbers and letters to explore the relationship between writing and art.

His health deteriorating, it took Demuth a year and a half to complete just three portraits—of Arthur Dove, Charles Duncan and Georgia O'Keeffe (right), who became a dear friend during these years and the inheritor in Demuth's will of his unsold paintings. Critics disliked the portraits, regarding them as too different from Demuth's earlier work. "I've never felt so low," he wrote Stieglitz in 1926. Nonetheless, he completed a subsequent portrait of Marin and his spectacular *I Saw the Figure Five in Gold*, a tribute to William Carlos Williams (p. 58). Based on Williams' poem "The Great Figure," it uses symbols, fragmented shapes and the vocabulary of Demuth's earlier architectural work to express simultaneous experiences.

During his final years, Demuth also painted watercolors, with a new restraint and authority: impeccable still life studies; a fresh series of illustrations with themes, once more, of illicit sex and amorality; and some pornographic scenes. Most memorable, however, was a group of architectural oil paintings of Lancaster. Begun in 1927, they were Demuth's final attempt to celebrate and encapsulate his America. The most powerful was *My Egypt*, dominated by a Lancaster grain elevator (opposite). The painting's title reflected, according to Barbara Haskell, the Egyptomania of the time and, more important, identified Lancaster as the place of Demuth's bondage, as Egypt was for its Jewish slaves. The artist described his later Lancaster work as having a "strange, inner strange look."

On October 25, 1935, when he was 51, Demuth suffered a hypoglycemic attack. That evening, he died. His home in Lancaster is now open to the public and is administered by the Demuth Foundation.

For Demuth's first retrospective at the Whitney, in 1938, the *Partisan Review* published a tribute, saying that his influence, though not wide, could in depth "be incalculable. To enter these exhibition rooms is to discover a world where everything is digested and understood. There are no 'cocktails,' no quickly-shaken mixtures of alien styles. . . . So it is that when your world is finally broken into, there is no trace of vulgarity."

Beinecke Rare Book and Manuscript Library, Yale University

Portrait tribute to Georgia O'Keeffe was the first of his group of homages to admired writers and artists.

In *My Egypt*, a Lancaster grain elevator stood for Demuth's roots, bondage, as ancient Egypt did for Jews.

Whitney Museum of American Art

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By Bruce Fellman

Researchers climb inside of the fire to tweak the flame

Laser probes are showing us how to burn fuel with more efficiency and less pollution—and how to better put out the fires we don't want

Somewhere, Boss Ket is smiling. Before his death in 1958 the "Boss," Charles F. Kettering, founder of the General Motors Research Laboratories and former director of the Sloan-Kettering Institute for Cancer Research in New York, had a lament about automobile engines that applied equally well to all the combustion devices of his day: "So I say, quite solemnly, that we haven't the slightest idea what really makes the contraption run. We call the reaction 'combustion' because it nicely conceals our lack of knowledge on just what takes place in the engine cylinder. I just don't think we can live in this atmosphere of ignorance when our whole business depends on it."

Indeed, from the beginning our civilization has been running on fire, yet half a million years after our ancestors first domesticated the beast, we still know very little about it. Fire has always been a Faustian bargain in that the benefits are offset by pollutants and toxins produced as by-products. In centuries past we had hearth fires that covered the insides of our dwellings with soot and filled the air over cities with a smog that was beyond belief. Today our internal-combustion engines and high-temperature processes may be killing continents with acid rain. Because of looming scarcities we must learn how to burn existing fuels more efficiently and how to use new fuels—from garbage to the culm left from coal mining—with which we have little experience. We know what a candle looks like when it burns; now we need to solve the mysteries of what happens within the flame itself.

Thirty years ago Boss Ket ordered his minions to "climb inside and ride up and down on the piston." But 30 years ago, that job was impossible—the ten-millisecond trip was too fast to observe. Today, though, in dozens of labs around the world, scientists are "riding the piston" with sophisticated lasers, elegant mathematics, supercomputers and ingenious devices capable of simulating every variety of combustion. Their goal is to bring back a map of the trip.

"The development of beautiful diagnostic methods enables us to slice through and unpeel a flame," says Howard B. Palmer, professor of energy science at Penn State University and president of the Combustion Institute, the largest professional organization in this field. Many in the business like to talk about "tweaking the flame": playing molecular traffic cop to make the hundreds of chemical reactions that take place in as little as a millionth of a second work more to our liking. While such Promethean powers are not yet available, the emerging knowledge about what makes a fire tick, so to speak, has already suggested solutions for problems ranging from a diesel's bad breath to figuring out the optimal size for water droplets in an automatic sprinkler system.

Finding the fuel that didn't burn

Consider the case of the unburned hydrocarbons. The business end of most fuels is a collection of carbon and hydrogen atoms, and to convince these hydrocarbons to burn, heat and oxygen are required. In an internal-combustion engine—the kind that powers most cars—the convincing takes place in a metal cylinder in which sit a piston, the action end of a spark plug (which supplies the heat), valves to let in a mixture of air (which includes oxygen) and gasoline, valves to let out the exhaust, and other equipment best explained by a competent mechanic.

Not all the gasoline burns, however. Unburned hydrocarbons blow out the tail pipe with the rest of the exhaust, wasting fuel and polluting the atmosphere. Until recently, no one knew why. The case was cracked in the late 1970s by researchers at the Ford Motor Company, who were then joined by scientists working at other labs. One of these was the Combustion Research Facility (CRF) in Livermore, California. Operated for the U.S. Department of Energy by Sandia National Laboratories, CRF houses one of the country's most impressive collections of high-tech equipment for combustion surgery. Particularly noteworthy

As Alan Eckbreth watches, converging laser beams pierce a flame, revealing temperatures, constituents.

Photographs by Yoav/Phototake

Climbing inside to tweak the flame

To measure combustion heat of space shuttle engine, John Shirley uses fiber optics that carry laser light.

are its three Cray supercomputers and a trio of central lasers, named Diana, Sirius and Dye Blaster, whose custom-tailored beams can be ordered like room service anywhere in the main building. For their work in exploring fundamental engine-combustion processes, such as the unburned hydrocarbons problem, CRF researchers devised an engine quite unlike any coming out of Detroit. It has portholes and sits chugging away in a darkened lab where, on command, its innards are skewered by multicolored laser beams.

Laser probes at CRF and other labs, along with a new generation of innovative experiments, showed hydrocarbons hiding in cylinder crevices formed by the piston rings, the spark plug holders and the head gasket. This hidden fuel was never touched by the flame wave of ignited air and gas. Knowing this, engine designers were able to change the shape of the cylinder and eliminate some of the hiding places. That done, fewer recalcitrant molecules remained to pollute the air and automakers were able to improve fuel economy.

"Some real hard-nosed engineers have admitted that they couldn't have made the new generations of engines work without all of our fancy stuff," says CRF director Peter Mattern, a congenial, slightly dishevelled physicist with a passion for raising antique roses. "And it's not only the automobile business. Every industry that uses combustion is in the same boat."

Fingerprinting the molecules in a fire

To understand fire, the most important piece of equipment is the laser. When pure, intense laser light travels through a flame, it bumps into the molecules that happen to be in its path during a flight that may take one-billionth of a second. As a result of the encounters, a bit of light bounces off to the side of the beam. This "scattering," as scientists call it, is invisible to the naked eye, but when detected by spectroscopes and analyzed by computers it is as characteristic of a particular molecule as a fingerprint. In addition to providing an ID, the scattering patterns tell researchers all about who is living where and in what density, who is dallying with whom and at what speed, and the temperature at which they are carrying on.

Sketched on a computer by laser pointillism, a candle flame, for example, is a landscape of sharply different temperatures. The dark area surrounding the wick is a relatively cold zone, not much above the boiling point of water. But it is warm enough to power the heat-driven process called pyrolysis, in which the wax molecules break down to form gases. These combine with oxygen as they burn. Soot—tiny particles of almost pure carbon—is born in the hottest, blue flame

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Soot particles burn bright yellow-orange as Rich Axelbaum studies their formation in different flames.

Laser beams intersect in a spectroscopic technique known as CARS; John Stufflebeam checks alignment.

and it serves as the fuel for the candle's romantic yellow-orange glow. Soot burns largely at a flame's edge and tip; heat released as soot is consumed raises the temperature dramatically, sometimes to several thousand degrees F.

Before the laser, it had been impossible to determine the precise nature of this action, both because so many things are going on so quickly and because the probes themselves interfered with what they were trying to measure. Now scientists are confident that what they are seeing is real. "We believe we are not perturbing the combustion process with lasers," says Alan C. Eckbreth (p. 70), who has refined laser diagnostics to high art at his laboratory in the United Technologies Research Center (UTRC) in East Hartford, Connecticut. The soft-spoken, intense physicist explains that there are many ways to use light beams to probe flames, most of them based on the Nobel Prize-winning work of Indian physicist Sir C. V. Raman in the 1920s.

Eckbreth and his colleagues use lasers, in techniques known as Raman scattering, for a number of investigations, including one involving the U.S. space shuttle. The UTRC scientist explains that NASA wants to improve the durability of the turbine blades that are driven by a preburner in the shuttle's main engine. The metal is not lasting as long as it should, and while the turbine blades are not all that expensive, installing them costs a fortune.

No conventional probe can get inside a rocket engine while it is running, but with a laser system developed at UTRC, Eckbreth is confident that his team will be able to monitor temperatures in the preburner chamber. The trick, he says, is to make it cooler at the roots of the blades and warmer at their tips. Laser light conducted along fiber optics will tell the researchers how their adjustments to the burner change the temperature in both areas.

Eckbreth himself is a master of an even more sophisticated technique known as coherent anti-Stokes Raman spectroscopy (CARS), in which three laser beams interact with a combustion molecule to produce a new beam that is read for information. His crossed light sabers are a sight to behold. Pencil-thin beams crack the air as they are pulsed through a bewildering maze of mirrors and lenses. Focused on the desired spot in the flame, they create a starburst as they take a molecular census (above).

Perhaps the most important measurement is temperature, a critical piece of the combustion puzzle because it determines how a molecule will react when it meets a colleague. In an ideal world where pure fuels were perfectly burned, the end products would be carbon dioxide (CO_2) and water vapor. But nothing is perfect in this world, so these two substances always

Bruce Fellman, a science writer who lives in North Stonington, Connecticut, researches combustion efficiency with the wood stove that heats his home.

The difference between a shattered windshield and a shattered life.

On November 17, 1986, the car in which Tara Meyer was riding was in an accident. Like 150,000 other victims each year, her head hit and shattered the windshield.

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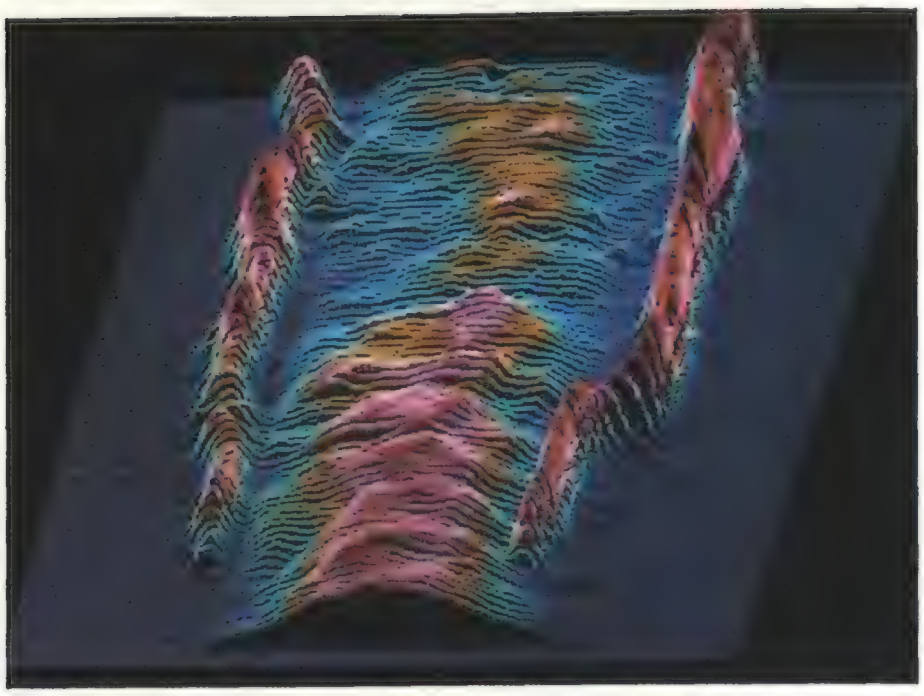
Inside an engine: wave of flame (dark ring) expands away from the spark plug electrodes within cylinder.



Pink peaks in graphic of flame cross section show that, at any instant, burning is limited to thin zones.

emerge from the flame with at least a little company, much of it decidedly unwanted. Oxides of nitrogen and sulfur are leading causes of smog and acid rain. Lead and carbon monoxide are toxins. Much particulate matter is carcinogenic.

Production of these noxious by-products can be minimized by bringing the flame as close as possible to theoretical perfection. Combustion is a network of interlocking chemical reactions. What an individual molecule will do at any given moment depends on the ambient conditions at that moment. The flame tweakers are looking for ways to ensure that the molecules do what they want them to do. (Even a "perfect" flame, however, produces CO_2, a leading cause of the greenhouse effect that threatens climate change on a planetary scale. The only way to eliminate CO_2 is to use a fuel that has no carbon, such as hydrogen.)

Researchers are looking particularly hard at nitrogen pollutants. The air that we and our combustion devices breathe is about three-fourths nitrogen, and many fuels are rich in this element. When the temperature exceeds 1,800 degrees F, as it does inside an automobile engine, nitrogen and oxygen combine to form a group of noxious nitrogen oxides known collectively as NO_X. If it were cooler inside an engine, less NO_X would form. But efficiency would also decline because engines work best at high temperatures. One solution is the catalytic converter, which purges enough NO_X from exhaust to keep the Environmental Protection Agency happy.

The diesel engine, however, is between a rock and a hard place. Catalytic converters cannot solve its breath problems and, because a diesel has to run hot, the only way so far to keep its NO_X output acceptable has been to tinker with the engine's timing. The compromise, though, is costly in terms of fuel economy and actually results in increased soot production.

Former CRF chemist Robert Perry and associates have developed a potential solution. He calls their invention RAPRENO$_X$, an acronym for "rapid reduction of nitrogen oxides." The basis of RAPRENO$_X$ is cyanuric acid, a common chemical that swimming pool owners use to extend the life of chlorine. When this compound interacts with NO_X, the near miraculous occurs. "There's almost a 100-percent reduction," says Perry, a quiet, almost shy, chemist.

The development of RAPRENO$_X$ is a perfect example of why the laser has become so important. Many scientific discoveries are supposedly serendipitous, but Perry did not start by sprinkling diesel exhaust with a variety of chemicals and then measuring the results. He and his co-workers at CRF had already used light beams to map out all the major reactions involving nitrogen that take place within the cylinder when the fuel burns. The researchers knew what went in. They knew what pathways the molecules traveled during combustion. And they knew what came out in the exhaust.

With that type of information, Perry had a pretty good idea of what kinds of chemicals would move the combustion reactions in a more desirable direction. It was predictable that when cyanuric acid was used, the diesel would exhale nitrogen rather than NO_X. If RAPRENO$_X$ works on the road the way it does in the lab—Perry has staked his future on it by starting his own company to develop his invention—diesel manufacturers will be able to change the timing of their engines to produce less soot.

The more that lasers pick apart basic combustion chemistry, the more likely it is that researchers will find ways to eliminate different pollutants. Nowhere is the need greater than it is in the case of coal, which has a long history as an environmental bad guy. Coal is a mutt mineral, an amalgamation of 250-million-year-old swamp plants turned to stone. When coal burns, its constituents can form an almost endless array of compounds. Few of them are pleasant and some, like NO_X and SO_X (oxides of sulfur important in the formation of acid rain), are notorious scourges.

In another darkened laboratory at CRF, a ruby-red laser beam courses through a yellow flame that is burning particles of coal the size of pinheads. The experiment simulates what happens during each grain's tortured, 20-millisecond flight through a boiler, and the laser captures details of the passage. The coal specks flare like meteors, give up their heat and gases, and then emerge as shells of spent minerals.

The information coming out of CRF's and others' laboratory boilers is being put to use in real ones. "When you understand why things happen, you can design systems to take advantage of them," says Alan W. Scaroni, a fuel scientist from Australia who now teaches at Penn State. He says the ideal coal burner may be one designed around the turn of the century that only recently has attracted attention from potential customers like power companies. The device is a "fluidized-bed reactor" and to explain how it works, Scaroni sticks my hand in a bucket of ordinary beach sand. "There's a lot of resistance to motion, but when you get the sand moving—when you fluidize the bed—it feels like your hand is in a bucket of water," he notes. He is right. The sand is "fluidized"—made to behave and feel like a fluid—by pumping air through it and thus suspending it.

Burning the waste from coal mines

In a working reactor, hot air fluidizes the bed material, often ground limestone, which transfers its heat to the fuel, which then burns. The burning is at relatively low temperatures, giving the reactor some important advantages over conventional systems. For one thing, the burner can be fired by materials, like trash, whose low energy content ordinarily makes them uneconomical fuels. Fluidized-bed reactors are already devouring piles of anthracite culm and bituminous gob, the remnants of coal mining, and they are being eyed by towns and cities whose overflowing dumps bear smelly witness to the need to find new ways for disposing of garbage. In addition, the low temperature means that NO_X formation is minimal; the limestone captures most of the sulfur compounds.

Power companies are currently testing these seem-

Chaotic flow of this flame was caught in burst of blue laser light lasting just ten-billionths of a second.

At Factory Mutual Research Test Center, sprinkler system is evaluated using a simulated warehouse fire.

ingly marvelous reactors to see if they are ready for the big time, while in the labs the laser probing continues. "The point of all this research is to understand combustion well enough so you can turn the right knobs and dial away what you want to eliminate without sacrificing efficiency," says CRF's Mattern.

The more we know, the better we can make things burn when we want them to—and the better we can stop them from burning. The lasers that can tell us what is happening in a flame can also tell us what happens when we try to put out a fire. In rural West Glocester, Rhode Island, at the Factory Mutual Research Test Center, the multibillion-dollar insurance group routinely reduces merchandise and full-scale models of buildings—the facility can house the immolation of a six-story office complex—to burnt offerings. It is done to determine how to avoid fires as well as to perfect ways of putting them out. These days their star extinguisher is an automatic sprinkler that goes by the name of Early Suppression—Fast Response. ESFR was developed to knock down warehouse fires before they rage out of control. John de Ris, principal research scientist at Factory Mutual, says lasers were used in designing ESFR "to get a clear idea of what size water droplet would do the job."

Water extinguishes a fire by cooling solid fuel, thereby preventing it from vaporizing and igniting. Big blazes create strong, rising air currents that prevent drops smaller than a certain size from ever getting to the fire. With a laser to detect what happens to individual drops, Factory Mutual researchers came up with a sprinkler that uses dual weapons: very large drops that penetrate the air currents and reach the fire, and very small ones that are carried up to the ceiling to cool accumulations of hot gases that could start to blaze or set off unneeded sprinklers.

That the design works is clear. Inside the test center stands a pair of 20-foot-high towers made of cardboard boxes. Someone yells "Go!" and two workers set the stacks burning. The flames grow quickly on a rich diet of air, paper and glue; off the crackling blaze rolls an eye-stinging, acrid fog. In a minute the bonfire is 30 feet high and growing as it radiates intense heat back toward the boxes and creates turbulent air currents that increase the burning rate. Then the ESFR sprinklers come on and the conflagration tableau turns steamy in an ersatz monsoon. With water absorbing its heat, the fire sputters and dies.

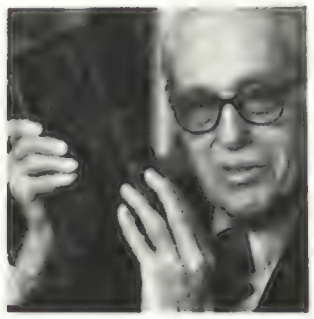
While fire researchers have come a long way in the past few years, as evidenced by the development of ESFR and other fire-suppression systems, they still find themselves confronting the same formidable obstacle —turbulence—that is challenging their peers in such disciplines as engine design and mathematics. The same turbulence that appeared in the burning boxes occurs in all burning. In things like automobile engines, it is good—up to a point. The more turbulent the combustion, the more efficiently the engine runs. But so far, turbulence is too complicated for scientists to get a handle on it. Peter Mattern says, "All practical combustion involves turbulence, but we don't yet know precisely how to deal with this concept. It's one of the last frontiers of modern science."

To understand turbulence, researchers must be able to substitute reliable computer models for time in the machine shop. A major requirement, then, is to get turbulence to sit still long enough to be translated into mathematics. It is not going to be easy, although it is already possible to create a believable computer model of what happens when one fuel droplet burns. By following the progress of various single molecules from birth to death in a flame, scientists are developing a way to visualize a rather simple variety of turbulence. (Its evolution resembles the growth of a meadow mushroom as the fungus pushes up from the ground and expands its cap.) As for depicting the flames in a fireplace, however, the supercomputer rebels. That level of mathematical modeling is still beyond us.

Despite my admiration for what the probers of the flame have been able to do, I'm not sorry that part of it is still beyond them. Man has stared into fires for a long time, and I still prefer to see mystery and romance in the dance of molecules over burning logs—instead of a set of partial differential equations.

The ability to generate models of a flame's turbulence still eludes even the most powerful supercomputer.

We asked these three experts to put a price on this edition of Dickens' DAVID COPPERFIELD. $14.50.



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By Richard Conniff

The so-so salesman who told millions how to make it big

Dale Carnegie didn't invent positive thinking, but 75 years ago he launched the program that enshrined it as a magic formula for success

Carnegie espoused a set of principles (opposite) for igniting "rocket of enthusiasm": build on confidence (Gibraltar) by mastering speech (the teeth), human relations (his book), positivism, salesmanship, name recollection, anxiety control (symbolized by pills).

Early on a weekday evening in Middletown, Connecticut, several dozen bank officers, company managers, engineers and nurses make their tentative way toward a meeting room at the back of a local department store. "Pick up a name tag at the door," urges a man of unprepossessing appearance, under 40, in a brown business suit. Then he looks up and, with alarming enthusiasm, exclaims, "Oh, you've *got* one. *Terrific*!"

We are about to embark on session 1A of an American institution, the Dale Carnegie Course in Effective Speaking and Human Relations, in which enthusiastic approval, warm as mother's milk, is the dominant emotion. Approval, the instructor explains, is going to help these brave souls conquer the "number one fear in America—worse than death, worse than losing a spouse: *public speaking*." He proceeds to paint an incandescent picture of personal growth and self-improvement. And such is the reach of the Dale Carnegie organization that other instructors in Tokyo, Rio de Janeiro, Dublin and Spokane are right now urging their nervous students to conjure up precisely the same odd picture: start with the Rock of Gibraltar (here the instructor does a shallow bend to indicate a knee-high Gibraltar). Now imagine a set of clacking teeth on top, biting into a copy of *How To Win Friends and Influence People* by Dale Carnegie. On top of the book, picture a bandleader ("What is he wearing? A tux? Good. What color is it?"). The bandleader is holding up a plus sign, with a For Sale sign balanced on top of that, supporting a pile of name tags, from which pills are spilling, igniting a skyrocket, which is going off into the sunset.

There, not quite in a nutshell, you have the entire Dale Carnegie course. There you have what 405 of the nation's top 500 companies not only urge on their employees, but gladly pay for, to the tune of $750 a head. There you have the course from which more than three million people, including the founders of the Amway Corporation, Mary Kay of Mary Kay Cosmetics and a cadre of Dallas Cowboys Cheerleaders, have graduated and gone on to glory. It is a course, says the instructor, that will build on the rock of self-confidence (Gibraltar), and go on to teach public speaking (those teeth), more effective human relations (the book), leadership, positive attitude, salesmanship, the importance of remembering names, and techniques for overcoming worry (symbolized by those pills), all of which will ultimately ignite the "rocket of enthusiasm." On this last phrase, the instructor parades up the middle of the classroom, knees bent, right hand shooting out to a brilliant, widening horizon.

At the back of the room, a dazzled student suddenly

Jill
Louise
Jon
Joel
Chris
FOR
How To
WIN
FRIENDS
AND
INFLUENCE
PEOPLE
Dale Carnegie
Lane Yerkes
'87

Led by instructor (right), members of Carnegie class in New York City start out with warm-up exercises.

Individuals pair off, rehearse on each other before delivering their speeches to reassembled class.

Smiling and gesturing easily, a student gains assurance by overcoming natural reluctance to speak in public.

envisions this as a scene in a Broadway musical, with Robert Preston in the role of the instructor, a smooth-talking music man, pitching hope and humbug to a credulous public. "Step right up, ladies and gentlemen. Don't be shy. Try the magic formula."

But the student is instantly conscious that there is a problem with this subversive image, and with all the familiar, cynical preconceptions about Carnegieism: the "Dale course," as it is sometimes fondly known, seems to work. Why else would 150,000 people in 68 countries sign up for it this year alone? If it didn't work, why should Dale Carnegie & Associates be a $100-million-a-year business 32 years after Dale Carnegie's death? If the magic formula (there is, in fact, a magic formula) weren't truly magic, why would so many graduates, Lee Iacocca notable among them, line up to offer their unpaid testimonials?

Carnegie, who taught his first class 75 years ago this month, liked to tell audiences that he started out as a commonplace sort of fellow. He was unathletic and slightly built. His voice lacked timbre and his accent had a Midwestern twang.

He was his own best testimonial

And yet you could see that he had achieved some sort of distinction. It was evident from the pince-nez glasses perched on an aquiline nose, above a cleft chin, and also from the professorial attire, the bow ties and red vests and the handkerchief in the breast pocket of his jacket. He cut a jaunty figure, bright-eyed, bouncing with enthusiasm. He liked to say that his own success astounded him, and the lesson in this hardly needed stating: if *he* could stand up and win over a skeptical audience, if *he* could parlay a simple understanding of human behavior into a successful career, so could you, so could anyone.

The way Carnegie told it, he had stumbled into success, beginning with that first class in October 1912. He was then 23 years old and at the low point in a brief but checkered career. After graduating from State Teachers College in Warrensburg, Missouri, he had sold (or failed to sell) correspondence courses to farmers in western Nebraska, then saved up $500 peddling bacon and lard for Armour & Company in the Dakota Badlands, then gone East to study drama (for his audition, Carnegie imitated a chair) and, finally, spent a year on the road playing Doctor Hartley in *Polly of the Circus*, before giving it up for what he deemed lack of talent compounded by bad food and seedy boardinghouses. In 1912, he was back in New York selling (or failing to sell) trucks and hating it.

Young Carnegie, or Carnagey, as the family then spelled its name, was both ambitious and harshly self-critical. The ambition seems to have come from his

mother, who had taken him around as a boy to deliver spoken pieces at Sunday school affairs, in the hope that he would develop into a minister. (A starchy Methodist, she kept an antidance tract entitled *From The Ball-Room To Hell* in the front hall. Dale later said he consulted it mainly for the pictures of girls in short skirts.) His mother was the reason the family sold its farm and moved to another outside Warrensburg so Dale could attend the state-supported college.

Among the bright lights of the campus, his own sense of inferiority drove him to thoughts of suicide. But "even though I was a poor boy whose clothes didn't fit . . . a farmer who had to milk the cows every night . . . I wanted to prove to them that . . . I was just as good as they were." His answer, his "shortcut to distinction," as he put it, was public speaking, and he became a success in the debating society.

The same answer naturally occurred during his second bout with the dark forces of negativism, in 1912. For Carnegie, selling trucks and eating in cheap restaurants didn't measure up. "I said, 'Dale, my boy, is this life? Is this the thing that you dreamed about back in college?' " His one accomplishment, he felt, was public speaking. "So I said, 'I'll teach businessmen to speak in public!' "

Exactly how or what to teach them appears not to have entered his head until the fatal moment. The director of the 125th Street YMCA agreed at first only to let Carnegie perform at a social evening. Accompanied by a pianist, Carnegie delivered a James Whitcomb Riley poem harking back to just the sort of farm life he had lately fled ("Orchard's where I'd ruther be—/ Needn't fence it in fer me. . . ."). He was a hit.

Anger breaks the bonds of fear

The doubtful YMCA director committed himself to paying Carnegie a commission for the public speaking course (rather than the flat $2 a night Carnegie requested), and he was off. But 15 minutes into the first class, he ground to a halt, having talked himself out. In desperation, he started calling on his students to speak. He had the sense to see that he wouldn't get far asking insurance salesmen to puff out their cheeks and recite "Horatius at the Bridge," so he suggested that they start with something that made them angry.

It was a brilliant idea, however simple. Carnegie soon found his classes full of students clamoring to speak their piece, but held back by "fear of the strangeness of getting up on their feet before a lot of people." Carnegie decided to get rid of the strangeness "by making every man talk, however briefly, at every meeting." That regimen became the basis for all that followed, and it remains the heart of the Dale course.

Partway through the first session in Middletown, the students begin facing up to the "number one fear in America" by introducing themselves to the class. To make it as easy as possible, a flip chart at the back of the room outlines the eight points speakers should cover, beginning with names and proceeding through family and work to reasons for taking the course. Eyes water and cheeks tremble, but everyone manages a short, coherent talk. Doreen, a shy, young bookkeeper, says she wants to learn how to mix better at her husband's business parties. Her husband, Joe, an architect, explains that he needs this course to help him deal with hostile zoning boards. The instructor replies that he'll soon be teaching tricks for gaining self-control in just such situations.

"What week is that?" the architect asks.

"Session 6."

"Too late," Joe moans.

Better late than never, Carnegie would almost cer-

Teaching a class 50 years ago, Carnegie squeezed arm of nervous student who was afraid to face audience.

Carnegie, who insisted the advice he dispensed was no bag of tricks, gave his dog an alfresco lecture.

On a visit to Trinidad, Carnegie showed his best-seller to a fellow tourist and members of a Hindu colony.

tainly reply. By the time *How To Win Friends and Influence People* was published in November 1936, he had been teaching for almost 25 years. He had long since changed his name from Dale Carnagey, accent on the second syllable, to Dale Carnegie, accent on the first. (The change may have come more easily because his father had always claimed distant kinship with Andrew Carnegie, and because it made good marketing sense.) He had also published a biography of one of his great heroes, *Lincoln: The Unknown*. It was largely an account of Mary Todd Lincoln's tyranny. Carnegie afterward ruefully described it as an "entirely autobiographical" account of his own first marriage to a German divorcée named Lolita Baucaire. That marriage ended in 1931.

Carnegie originally planned to call his new book *How To Make Friends and Influence People*, but the art department could not fit the whole title onto the binding. *How To Win Friends and Influence People* was not only a bit briefer, but more positive and euphonious. The phrase entered the language almost immediately. In Carnegie's lifetime, his book was to sell five million copies in English alone and to be translated into 31 languages. By 1986, the 50th anniversary of publication, sales had reached 15 million copies, not counting pirated editions.

A "golden rule" for advancement

The book, like the course, is a tireless endorsement of enthusiastic approval. Carnegie urged his readers to smile, be friendly and abstain from criticism. Winning friends, he said, was also a matter of trying to see the other person's point of view, giving the other guy credit for your good ideas and always offering praise and appreciation. Carnegie didn't pretend that any of these ideas were new. In one paragraph, he credited Zoroaster, Confucius, Lao-tse, Buddha and the sacred books of Hinduism with the cardinal rule of effective human relations, as summed up by Jesus Christ: "Do unto others as you would have them do unto you." But Carnegie was perhaps the first to propose "doing unto others" as a means of worldly self-advancement, a "shortcut to distinction" for ordinary people. And he presented his ideas with a brash, colloquial exuberance that readers found hard to resist.

A product of 19th-century rural oratory, Carnegie wrote naturally in the style of the traveling medicine show. One of his favorite stories, told at demonstration lectures, had to do with a man he had seen selling an antibaldness device in Huron, South Dakota. "You never see a bald-headed Indian, do you?" the man asked. "You never see a bald-headed woman, do you?" Well, why not? Because Indians and women wore thin soles and made good electrical contact with Mother

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Picture from 1930s periodical shows Carnegie (left) swatting speaker with a newspaper while other pupils jeer. Designed to teach class members self-control, heckling sessions are still part of "Dale course" today.

Earth. Now what a man in thick brogans needed was a set of these special metal tacks. . . . As Carnegie told it 40 years later to an audience of businessmen, he was among the suckers who ponied up a quarter for a set. "And look, it worked," he said, pointing at his full head of hair. "That was selling nothing but enthusiasm," he concluded. "Nothing but enthusiasm."

Carnegie sold enthusiasm, too, and in the same voice, merely updating it to the needs of the modern business world. He told inspirational stories, usually emphasizing that attitude mattered as much as ability. He offered secret formulas for success. He demonstrated down-to-earth shrewdness, as when he anticipated (and thus neutralized) the reader's doubtful reaction: "Ridiculous? Absurd? You are privileged to think anything you like. I am merely passing it on to you without comment."

His critics could easily imagine some medicine show shaman delivering these sentiments out of the corner of his mouth. James Thurber attacked him for "disingenuities." Sinclair Lewis protested that Carnegie feigned altruism even while "telling how to smile and bob and pretend to be interested in people's hobbies precisely so that you may screw things out of them." But what the critics took for cynicism was merely plainspoken realism to the general public. There was honesty in it when Carnegie stood up before a large crowd at the Hotel Astor and declared, "I have no doubt as to why you are here. You are not here because you are interested in me. You are here because you are interested in yourself and solutions to your problems."

The few scholars who have attempted to explain Carnegie's extraordinary success attribute it to two factors, apart from his own exuberant style. Along

Richard Conniff has written for SMITHSONIAN *on such subjects as bloodhounds, the tropical biologist Terry Erwin and the stage manager Alan Hall.*

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Dorothy Carnegie, who chairs board of the family-run company, displays bust of Dale. He died in 1955.

with other positive thinkers who became popular during the Depression, Carnegie distracted people from their troubles and restored their faith in traditional American notions about individualism, hard work and success. Anyone could still achieve wealth and social status. Carnegie showed how, or seemed to.

Carnegie also arrived on the scene at a time when mass production and bureaucratic organizations were making working life abstract and impersonal. His book was full of salesmen stuck in the rut of "cold calls" and of managers trying to motivate a faceless work force. Carnegie seemed to offer a way for the individual "to . . . rehumanize . . . this world of increasing rote," according to Donald Meyer, author of *The Positive Thinkers.* He celebrated the managers and salesmen who learned to accomplish this rehumanizing—not Andrew Carnegie, who built a steel empire, but Charles Schwab, who managed it with a smile "worth a million dollars." His book made heroes of the very people who were its most likely readers.

Halfway into the Carnegie course, the students' speeches tend to take on a semiheroic character, too. They tell tales of marital bickering transmuted to mutual consideration, of office crises overcome, of anxiety conquered. Thus the president of a small publishing company explains her latest Carnegie coup: she has just managed, without creating antagonism, to take a newsletter editorship away from an older man and give it to a more aggressive newcomer. "The way I started," she says, "was with the Dale Carnegie technique of getting the other person to say, 'Yes, yes, yes,' from the beginning, to put him in a positive frame of mind. I told him he was absolutely right in everything he'd been saying, that he really needed more time, that the other publications he'd been working on were too valuable to neglect. I made him feel important and gave him a good reputation to live up to. He ended up suggesting the change."

After each speech, the instructor makes a comment, always positive, in keeping with the first law of Carnegieism: "Don't criticize, condemn or complain." Sometimes, however, instructors do correct. At session 10, a speaker is recounting a drug-related incident that left him penniless and emaciated somewhere in the Middle East. With the two-minute time limit on his talk approaching and no lesson for the audience in sight, the instructor interrupts: "What about us, Ken?" she asks. When another speaker gets off to a vague start on the subject of his overly critical boss, the instructor cuts him off. "Tell us one time when it happened," she says. When he continues to waffle, she does not push the point. "What you've showed us," she says later, "is to be more complimentary, more understanding, rather than focus on the negative, because of what it does to the other person."

If the students have any problem with Carnegieism, it may be with just this unswerving positivism, which seems at times to defy human nature. During a debate on capital punishment, a young man in a black T-shirt declares: "Maybe the punishment should fit the crime. Maybe the guy who sticks his wife in the wood chipper should get stuck in the wood chipper himself for a while." When he sits down everyone dutifully applauds, including students who've just denounced the death penalty. Afterward the instructor praises them all for disagreeing without getting angry. "But if you hold back too much," a student replies, "you don't put out any energy. If there's no heat, there's no lightning." And another student adds that in real life, both sides have something to win or lose in an argument. The intensity is missing here.

What to do when all else fails

Outside critics say essentially the same thing. Chuck Dwyer, a business consultant and education professor at the University of Pennsylvania, faults Carnegieism for giving no sense of what to do when positive approaches fail. Carnegie students certainly are not taught that it may occasionally pay to deliver a negative message, as did Lee Iacocca, Dwyer notes a shade mischievously, when he fired about 30 vice presidents soon after taking over at the Chrysler Corporation.

Carnegie himself seems to have recognized the omission. According to Dorothy Carnegie, his widow, *How*

Seoul man.

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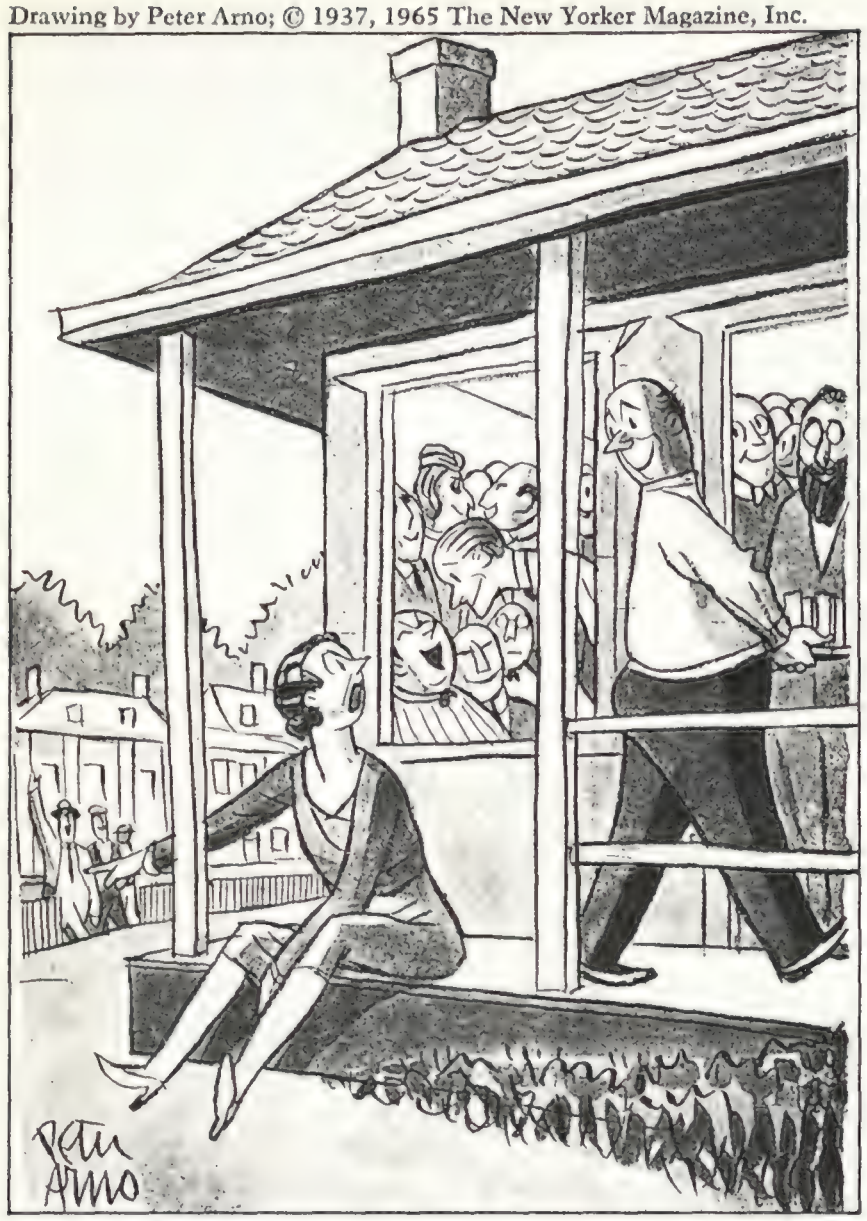


"*More* friends of yours! I wish to God you'd never heard of Dale Carnegie!"

To Win Friends and Influence People was originally to have contained an additional chapter. It would have talked about the exceptions, the times when there is no choice but to divorce, or go to war or knock the other guy down. "Of course, he would have put it in a far more palatable way," she says. "The idea was, don't be discouraged if it doesn't work 100 percent of the time." But Carnegie apparently could not bring himself to confront so stark a truth, however palatably stated, and he left the final chapter unwritten. The world was already amply endowed with lessons in assertiveness.

A second, sharper criticism comes from Donald Meyer, who challenges Carnegieism on its own ground of smiling, upbeat effectiveness. "As for winning friends," he writes, "one of the peculiarities of the famous book was that it had practically nothing to say of friendship." Rather, Carnegie offered an impersonal brand of personality, a world of people putting on a face to meet the faces that they meet. He did not show how to break through the "world of increasing rote," but how to make it work more smoothly. A good thing, perhaps. But Meyer worries that, by constantly putting on a smile-button facade, individuals collaborate in the disintegration of just those quirky traits that make them individuals.

Dale Carnegie remained undaunted by his critics and also unencumbered by his own success. He continued to live in a modest house in the Forest Hills section of Queens, and sometimes tried out anecdotes on fellow passengers in the subway. In Dorothy, his second wife, he chose a Carnegie graduate who shared his own Midwestern values. A handsome woman with red hair and high cheekbones, she lives now on Long Island where the Carnegie enterprises are headquartered. Something of a firecracker, she wields a gold cigarette lighter and recalls that she liked to twit her husband by defending Mary Todd Lincoln. The two of them ran Carnegie's business as partners. Indeed, she recalls that he appreciated her good business sense and her attention to detail.

After Carnegie's death from uremia in 1955, Dorothy took over the enterprise and transformed it from "a Mom-and-Pop store" into a carefully managed commercial operation. (The family still owns the company and Dorothy remains chairman of the board.) To *Time,* Carnegieism was by then already a "quasi religion." Though Carnegie may not have intended this result, he provided the textual basis for it. "I am not advocating a bag of tricks," he wrote. "I am talking about a new way of life."

Spiritual conviction remains at the heart of Carnegieism today. It is apparently what motivates the 3,000 Carnegie instructors around the world, most of whom work full time at other jobs—as contractors, dentists, lawyers, teachers. (An instructor typically earns only about $100 a session, or roughly $1,400 for a complete course, and to become licensed in the first place must pay $750 and spend two years in part-time training.) Most say they do it to improve their own skill at working with people and also for the satisfaction of helping others. They do it, in other words, because they believe in it.

Session 14 marches up and down the hill

And so do the students they teach. In a meeting room of a Madison Avenue hotel, session 14 of the Dale course gets off to a raucous start as a roomful of men and women jump up, sit down, crouch and stand up again while chanting a standard Carnegie warm-up: "The Grand Old Duke of York,/ He had 10,000 men./ He marched them up the hill,/ He marched them down again." It is an unlikely bit of doggerel, but it gets the blood going. Then it is time for the students to deliver their first talk of the evening.

By now, this group has been through it all. The stu-

dents have survived session 5, the "heckling session," where they learned to get across their point of view even as fellow students shouted and jeered. They have also absorbed the magic formula and they use it now as a framework for their talks. They begin with a specific incident. Then they proceed to make a point, some action they can take ("I'm going to start living my life day by day"; "I'm going to be a Daddy to my kids and not just a father"). Finally, they suggest ways in which the audience might benefit if it also takes action ("If you break a large problem up into little bits and then attack each one, you'll solve your problem without anxiety").

The instructor comments enthusiastically ("Quality time with the family—what could be more important?") and, after everyone has spoken, everyone pops up again to deliver a four- or five-word capsule summary of his talk, as a reminder and a sales pitch. From a woman trying to look better: "Working my way to becoming Raquel Welch." From a lingerie-company executive who wants to try real estate: "Today panties, tomorrow the Meadowlands." From an angry father on the road to reform: "From tyrant to soft touch." Then the class votes awards in several categories. The winners deliver their acceptance speeches, collect their prizes, inscribe their names on an award chart located at the front of the room and sit down again to gratifying applause.

At the very least, Carnegieism has already helped these people appear more poised, self-confident, positive. Will it also serve them as a way of life? As they head back out into the hectic modern world, Dale Carnegie's latest initiates seem content simply to have a new bag of tricks.

Epitomizing the kind of enthusiasm and conviction Carnegie considered essential to success, students pull out all stops while delivering two-minute speeches about subjects that are extremely important to them.

By Michael H. Robinson

In a world of silken lines, touch must be exquisitely fine

Dependent on vibrations, Argiope *spiders fit their tactics to their prey, mate in bizarre ways and spin mysterious patterns into their webs*

Robber fly captured in web is enswathed in the silk strands flowing from the spinnerets of female *Argiope*.

The most difficult problem any student of animal behavior faces is that of shedding human preconceptions and attitudes and getting "inside the skin" of his animal. The world we humans are aware of is determined by the biases of our sense organs. We share a primate's viewpoint with a tiny fraction of the animal kingdom. Just a handful of species sees the same range of colors from a similar height and a broadly equivalent focal length. Other animals have different perceptions, very different dominant senses and certainly live in a world that is difficult for us to visualize.

We are limited even in visual perception. The poet and essayist Alexander Pope was acutely aware of this limit. He summarized our sensory isolation in two neat lines: "Why has not man a microscopic eye?/ For this plain reason, man is not a fly." As a student of relatively small beasties I often long for a microscopic eye, but it would be almost useless for mediating life at the scale of our normal existence. Pope, in the same wonderful poem called "An Essay on Man," also perceived the quintessence of the spider's very different world: "The spider's touch, how exquisitely fine!/ Feels at each thread, and lives along the line." He must surely have possessed an exquisite eye for detail, must have watched and studied spiders. Theirs is indeed a world of touch.

All spiders produce silk, and not only silk but several different kinds of it. A highly complex protein, it is synthesized in glands near the apex of the abdomen and issues forth through special spigots called spinnerets. When a spider moves from place to place it pays out a silk line. When it is ascending or descending, this silk line acts like the climbing rope of a rock or mountain climber. On the flat the spider lays out its dragline behind it, like Theseus moving through the Minotaur's maze with his ball of string. Male spiders can find females by following this telltale trace. Spiders also use silk for building webs, which are amazingly diverse in structure, as well as for making

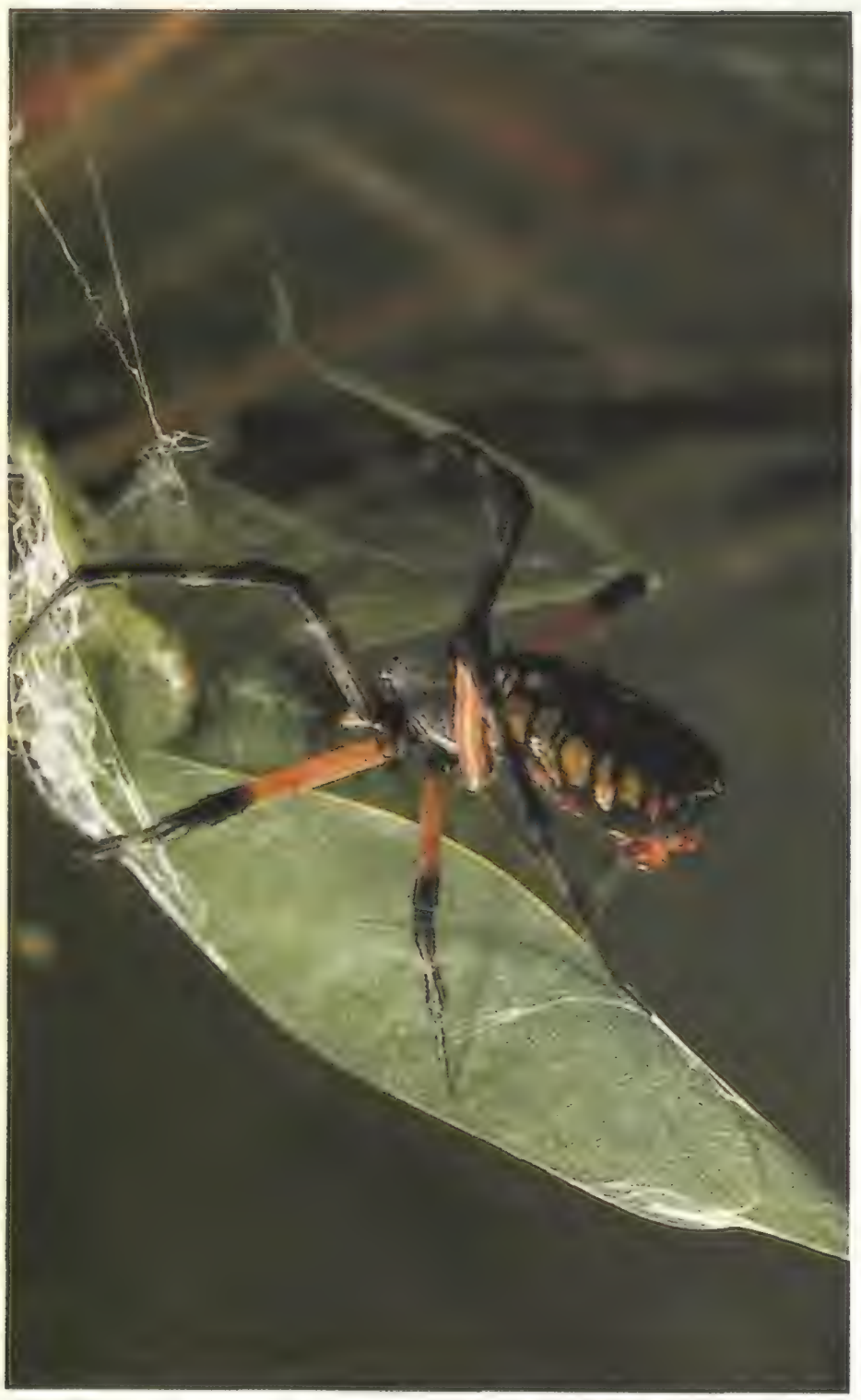
She uses the topmost pair of legs to guide silk,
the next pair down to rotate victim as it is wrapped.

egg sacs, trapdoors and the sperm webs of the males. The central role of silk and silk structures in the lives of many spiders is reflected in their superb sense of touch and exquisitely sensitive vibration receptors.

In a world of melodies and cacophonies played on silk, vision is almost always much less important. Most spiders have eight eyes arranged in two rows of four. They are generally much inferior to the eyes of insects and probably just movement detectors and monitors of light intensity. (Of course, some spiders have eyes capable of some kind of form vision and certainly of precise movement detection. The jumping spiders have relatively large eyes and use them to locate prey; even their courtship depends on visual signals.) The majority of spiders, however, have eyes that are small and that pale into insignificance in comparison with their vibration receptors. These spiders almost certainly live in a world where nearly all objects

Photographs by Robert Noonan

Butterfly can escape when its wing scales come off on web, so spider encages it with her legs as she bites it.



Another female has no trouble with a katydid larger than herself; two legs remain to be fully packaged.

have a resonance or vibration fingerprint. It is difficult to imagine a world where a potential sex partner is largely a tune on a thread, rather than an image.

Spiders have become widely diverse in their ways of life; there are species whose habits are bizarre to the point of extreme improbability. The unifying theme among this diversity is that almost all spiders are hunters of one kind or another. The hunted, overwhelmingly, are the insects. Hunting techniques range from simple prowling to the use of sophisticated traps of marvelous construction. Spiders build complicated traps that rival those of Man in apparent ingenuity. A review of webs and weblike structures would require an entire book, which has yet to be written, although it has been attempted several times. Discovery always outpaces the literature.

The family of orb-weaving spiders is arguably the most advanced of all. They are certainly a conspicuous element in our lives because their webs are ubiquitous. To present an account of the life of a web spider one must narrow the field to a single group within the web-building family. To do this I have chosen to concentrate on the genus *Argiope* because it contains many species that are widespread and often amazingly beautiful. In addition, I have spent nearly 20 years worldwide, probing intimately into their lives. There is little agreement of how the name should be pronounced. My preference is for Ar-guy-oh-pee, but Ar-gee-o-pee and Ar-gee-ope are common variants.

Orb-weaving spiders typically build a web that is essentially wheel-like: it has an outer rim (frame) and a number of spokes (radii) emanating from a hub. Hub is a good word because it is not necessarily at the

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Jewels by David Webb.

geometric center of the web. Laid down on top of the radii, in a spiral built inward from the outside, is a special silk covered with droplets of glue. This is called the viscid, or sticky, spiral and converts the framework into a trap. Orb webs are marvels of geometry and construction. They are built according to a complex behavioral program, which is highly flexible in some respects and very precise in others. Each species of spider builds a web that is identifiably unique and therefore species-specific. On the other hand, the spider can vary the size and proportions of the web, within limits, to fit it into a variety of sites. This flexible program is most important for survival because the spider must be able to exploit local abundances of insects in otherwise constraining web sites. Spiders can, and do, do this. I once recorded in Panama eight webs of *Argiope argentata* ringing a single pineapple flower—the only flower in bloom for many feet—trapping the bonanza of bees on the site. That was flexible opportunism. The remarkable thing is that the web-building program is hard-wired into the spider's brain, along with a considerable amount of other information needed for survival.

A young female grips her web with some legs and uses others to hold the cabbage butterfly she is eating.

The web greatly extends the area over which a spider can detect prey. Usually the spider sits at the hub, feeling at the threads, as Pope so astutely observed. Because of its structure, the web allows the spider to locate quickly any object that strikes it. Those that move after impact usually elicit very rapid responses, whereas objects that remain motionless appear to be less stimulating and are perhaps more difficult to find. When a buzzing or kicking insect hits the web, the spider sets off toward it with remarkable rapidity: it literally runs to the site. Once it gets there, the spider has to attack, subdue and package the prey. The web alone is a relatively inefficient trap, but the spider is an amazingly efficient supplement.

Anyone who admires the superb, lithe muscularity of mammalian predators such as cheetahs, leopards or otters would instantly recognize that *Argiope* species are cast in the same mold. The spiders are quick, reactive, superbly efficient and ultimately graceful. Of course, custom predisposes us to see grace more easily in four-footed beasts rather than in the more complex coordination of eight legs. But eight legs certainly divide the labor.

All *Argiope* species have two fundamentally different attack patterns. They may rush at an insect and enswathe it in silk, or they may immediately seize it in their jaws and administer a bite. The bite attack is relatively simple. If the prey is not very large but is active, the spider charges it and in one fluid and continuous motion contacts it with its leading legs, runs onto it and sinks its jaws into the nearest point. Ultimately, it shifts the bite to a vital spot, just as a big cat will bite the neck of an antelope.

If the prey is very large, like a struggling moth, the bite is a complex, coordinated movement of jaws and legs. It is better described as a bite-and-clasp: as the spider inserts its fangs, the eight legs close around the insect like the fingers of a hand grasping a slippery object. The insect is then trapped in a cage of legs. Despite the grasping action, an insect may struggle free of the web—but it still does not escape the spider. Because the spider is attached to the hub of its web by its dragline, it may even "ride" a partly freed, flapping

Michael H. Robinson, a tropical biologist who is director of the National Zoological Park, has written on zoo visitors and tropical spiders in SMITHSONIAN.

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insect, perched like a jockey on a horse. Biting of all but the smallest prey is followed, at length, by wrapping. This is a process in which the spider simply enswathes the inert insect in silk. Wrapping effectively packages the prey: all the projecting appendages are bound into a tight, smooth parcel.

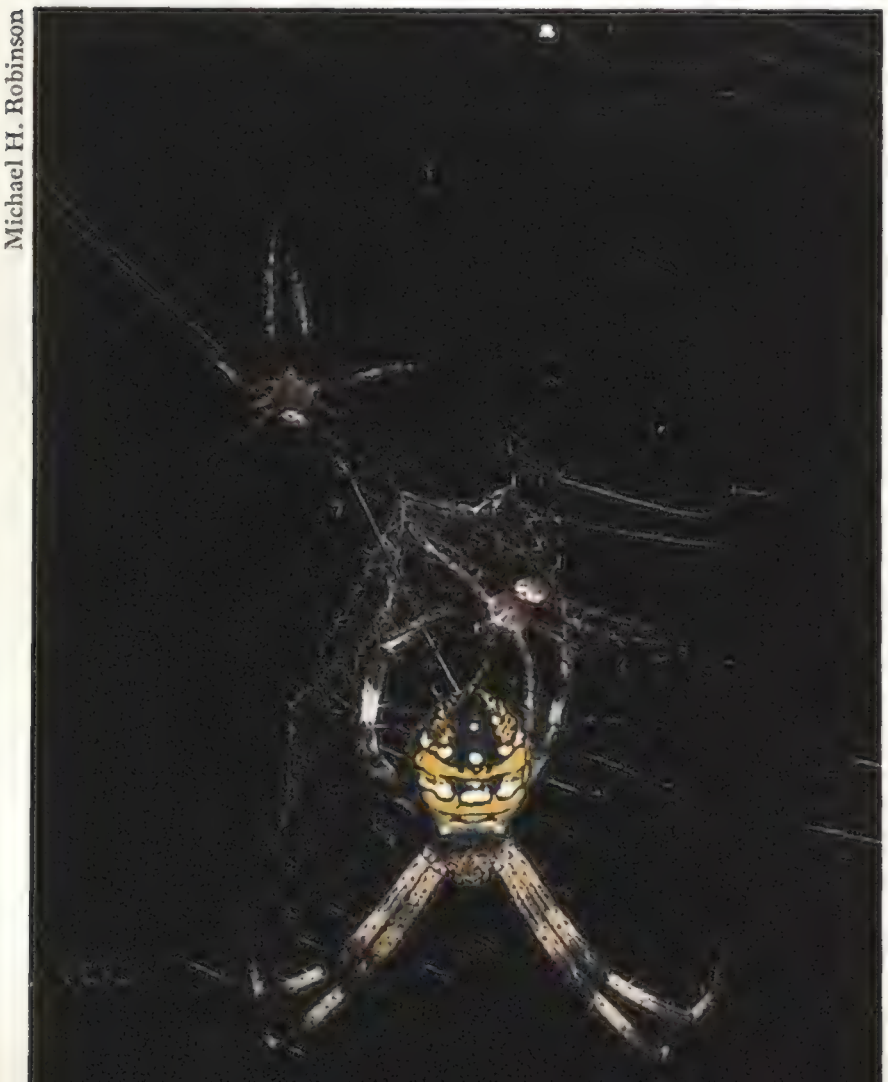
Wrapping attacks are usually more complex than biting and vary somewhat according to the size and activity of the trapped insect. The spider starts by casting broad bands of silk over its prey; then this process merges into a process of enswathement. It might be compared with lassoing followed by hog-tying. The silk throwing traps the insect against the web while the enswathing binds it and packages it. In the most complex attack, on a large, convulsively kicking grasshopper, for instance, the discrete stages of the attack may be most conspicuous. The spider is aware of the size and violence of the prey before it arrives on the scene. Its vibration receptors and the distribution of tensions across the web have signaled where the insect is and that it is both heavy and active. At the capture site, the spider may face away from the struggling insect and cast great swathes of multistrand silk over the prey. These partly sandwich the prey between the web and the wrapping silk and also serve to pinion the kicking legs and thrashing appendages. As sheet after sheet of silk is thrown over and onto the insect, the spider moves closer to stand above its victim. Imperceptibly, the throwing movements of the fourth legs impart a spinning movement to the prey, which comes to resemble a spitted joint of meat on a rotisserie. The insect turns, largely free of the web, between the spider's shorter third legs, while silk is laid down in streams from the spinnerets. The prey is bound tight in a package as the spider seems to be monitoring the firmness of the silk straitjacket with its touch sensors. The final coup de grace is administered in a bite through the silk shroud. Of course, details vary: sometimes the struggles are so titanic that the insect may break loose and escape. But in general the wrapping attack is an impressive piece of specialized behavior. It invites outlandish comparisons that are not unrealistic. Imagine a tiger that throws a net over an antelope and then ties its feet together, before trussing legs to body and putting it in a silk gunnysack!

After the prey is subdued, either by bite-wrap or wrap-bite attack couplets, it must be transported. If the spider were to eat the prey where it stands, it would not be at the nerve center of the web, ready to attack when other insects were netted. All *Argiope* species feed at the hub of the web. (Some other orb weavers spend the day in retreats away from the web, but they attach a signal line to the hub to alert them if prey strikes the web.)

The ability of these spiders to fit their tactics to the situation has fascinated me for years. My first studies of *Argiope* species started with the casual observation that *A. argentata* in Panama attacked different insects

Two males approach a much larger female. Suitor at left has cut web, spanned gap with a mating thread.

Michael H. Robinson



The female at center has just shed her exoskeleton (top). A male is taking advantage of her helplessness.

in different ways. It attack-wrapped grasshoppers, beetles, bugs, bees and crickets, and made biting attacks on butterflies and moths. This apparent taxonomic discrimination was enough to pique scientific curiosity. Was it really true and, if so, why and how did the spider discriminate? It certainly turned out to be true; so far, every species of *Argiope* that has been tested attacks butterflies and moths by biting, and other kinds of insects by wrapping. The answer to why is also pretty well established: butterflies and moths have scales on their large wings and these wing scales are loosely attached and come off on the glue of spiders' webs. Wing scales on glue are like sand on a tar patch—it no longer sticks—and lepidopterans (butterflies and moths) are uniquely nonstick on webs. This means that they escape rapidly, and since they are edible and common, it also means that the spider is losing an important potential food supply unless it restrains them on impact. To do this, the biting attack is infinitely faster than wrapping. Why not, then, bite all insects? The answer is equally logical. Other insects can kick, bite and perhaps sting. Wrapping is a less intimate attack than biting. It allows the spider to attack prey larger than itself, including dangerous prey.

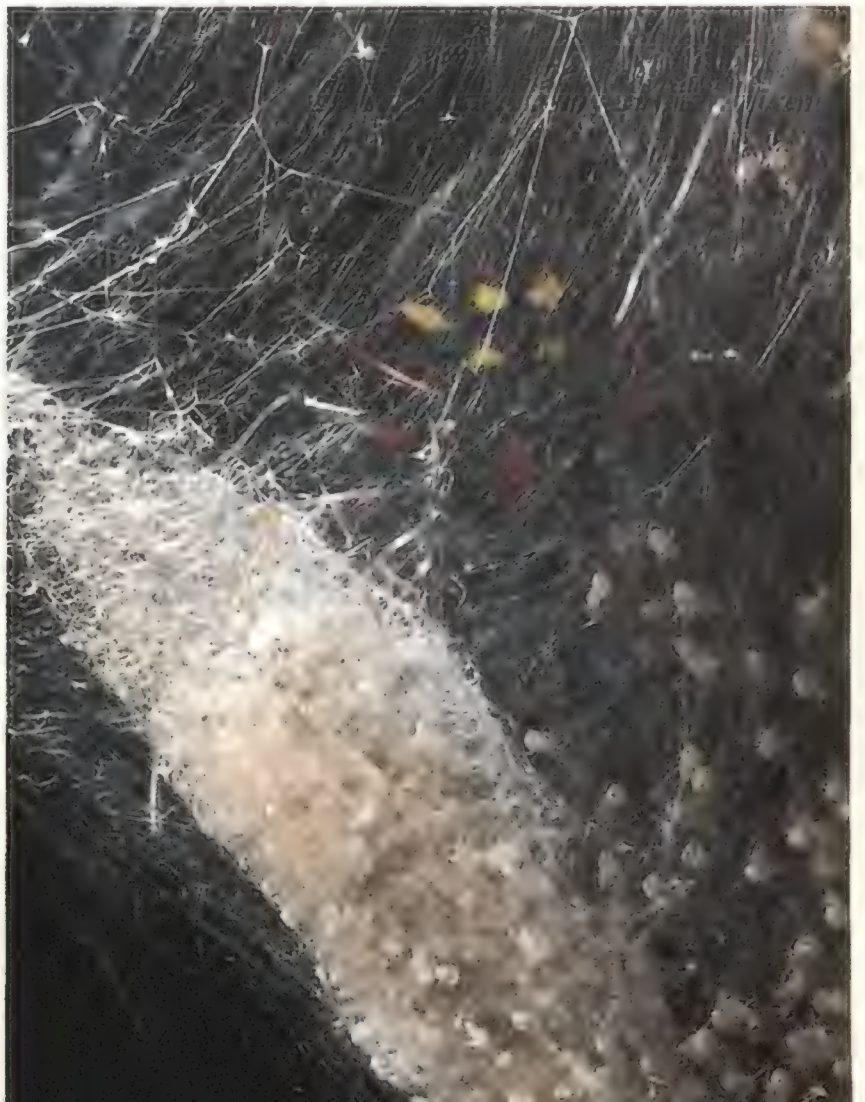
Argiopes' ability to discriminate is built into their brains. They don't have to learn it. The first time ever that they encounter a moth they do the right thing. But even with the rapid bite attack, spiders still lose many moths. The arms race has gone beyond specialized attack behavior. One moth specialist, the bolas spider, has developed a moth attractant (a lure for male moths) and almost certainly a superglue that defeats the moth's scales. Spider versus moth is an evolutionary arms race in which the next move seems to be up to the lepidopterans. Perhaps it already exists and awaits discovery.

In the last analysis, all the efficiencies of predatory behavior, web structure and strategy are but means to an end. The ultimate aim is reproduction. Food is mere fuel for courtship, mating and propagation. As might be expected, the sex life of spiders is often bizarre. It certainly suggests that the mating devices of other groups (which seem such obvious—and only—solutions to the problem of bringing together male and female gametes) are "normal" only from our own homocentric viewpoint. Nearly all the arachnids (the big group to which spiders belong, along with scorpions, ticks, daddy longlegs and so on) have what is called indirect sperm transfer. This means that instead of sperm being transferred directly from the male sex organs to the female sex opening, it is first transferred to some other structure.

The sperm-transfer organs of male spiders are on the front end of the body. These "feelers," called pedipalps, are modified for sperm storage and transfer. The essential parts are a sperm-storage sac and the sperm-transfer tube attached to it. In a sense it is like the ink storage and nib of an old-fashioned fountain

Female, having laid a bulging egg mass, will suspend it from platform of wooly silk fluffed up by her legs.

Tiny young spiders swarm at lower right as eggs of tropical *Argiope* hatch. Mother is faintly visible above.



A spider ingests the silk of a worn-out web. Biologists know from radioactive tracers that it is used again.

pen, except that the "nib" is a tubular stylus called an embolus. Before courting, the male builds a sperm web, a small sheet of silk onto which he passes the sperm from his abdomen. He then turns around and charges his pedipalps with sperm (like filling the fountain pen from the inkpot). Thus charged up, he is ready to go. The next step is courtship. This is often complex and is species-specific.

In all *Argiope* species the males are tiny compared to the females. They approach a female across the web, and are so small and light that their stealthy approach may be too insignificant to stimulate her predatory responses. Whatever the reason, they usually finish up at the hub unmolested. There they may seem to wait for an opportune moment. Several males may thus assemble at the hub of the web—the so-called suitor phenomenon. From this stage on, there are two basic patterns of courtship. The simplest is when the male moves from the web onto the surface of the female's body and, after a variable period of tapping, stroking and walking around, descends the ventral surface of her abdomen. As he descends he is belayed, like a rock climber, by his dragline. When opposite her genital opening he may beat on it with his pedipalps and eventually try to insert the needlelike intromittent part. In the insertion posture he is face to face and parallel to her, but the minute he is successful he rapidly turns sideways, pivoting on the pedipalp to lie in the "slit trench" formed by her waist. This is a very important move because the female may scrabble at him and try to bend at the middle and pick him off in her jaws. It is clearly protective to turn sideways and lie low. Copulation does not last long and is ended by the male jumping backward out of harm's way.

Courtship dance on the mating thread

The other kind of courtship starts in the same way, but after a great deal of contact courtship, stroking, rubbing and scrabbling, the male proceeds to cut a hole in the web close to the hub, biting out radii with his jaws. Web tension causes the hole to enlarge, just like a run in a nylon stocking, and the male then builds a thread across the gap from the cut end of a radius to the hub silk. The male assumes a position hanging below his mating thread close to its midpoint. Here he carries out an elaborate vibratory display, at least as complex as the courtship of many birds and fishes. The male bounces on the thread in complicated rhythms, strums and plucks it. If the female is ready and willing, she eventually responds to the male by moving from the hub onto his mating thread and hanging passively in front of him. Her acceptance posture exposes her abdomen to him and he climbs onto it. The act of insertion follows—if all is well.

Of course, life is usually more complicated; many things can and do go wrong. Nothing ever runs as smoothly as a scientist's description culled from hundreds of observations. Two males may strum simultaneously from opposite sides so that the female can make a choice between them. Females will mate successively with a number of males until they have enough sperm stored to last them for many batches of eggs. Once they have enough they react vigorously to the males' touching, stroking and strumming and drive them off or occasionally catch and eat them. The suitor phenomenon, when several males arrive on the web of a female, may acquire an even more courtly medieval flavor when the males wait on the web of a female who is one molt away from maturity. They are waiting to obtain a competitive advantage when she comes of age. To be there alone, or even first, may establish a priority. If they are there when she makes her last molt they may dispense with courtship altogether and mate while she is still helpless, with her new skele-

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The zigzag bands of silvery ribbon silk make up the stabilimentum, the "signature" of all *Argiope* spiders.

ton like that of a soft-shelled crab. Such opportunistic mating may also occur if the female is feeding on a large insect and her jaws are occupied. All this suggests that one of the functions of courtship in spiders may be to reduce the predatory drive of the female.

Several weeks after mating, the female is ready to lay eggs. The eggs are protected by an elaborately cushioned cocoon, or egg sac, that is built of silk. It is multilayered and the silk varies from downy thread on the inside to a tough, colored outer layer. The egg sac is usually suspended in vegetation near the web and the greenish color probably helps to camouflage it. In the tropics the eggs may take only a few weeks to hatch while in the temperate regions the egg sac may be an overwintering device. When the young spiders emerge they have already molted once and face a precarious period during which they must disperse, build miniature webs and fend for themselves.

Baby spiders disperse either by "gossamer flight" or by making vast aerial walkways. In the first method, the little spider climbs to a high place, tilts its abdomen into the air and pays out a length of silk. This acts like a kite and, if the breeze is right, carries the tiny spiderling off into the yonder. In this way the young may be carried high into the air and for great distances. Spiders are for this reason early colonizers of newly formed islands and have been found in aerial plankton samples taken in airplanes tens of thousands of feet above the ground. The other method of dispersal involves paying out silk into the breeze, waiting for it to attach to a distant object, pulling it taut and then marching off into the unknown, walking on the original "Silk Road."

This account of the life of an orb-web spider is, of course, a composite derived from studies of several species. It is oversimplified and incomplete. Defenses against predators, parasites and climatic disasters—all part of the animal's complex life—are beyond the scope of this article.

But it would be wrong to leave the *Argiope* spiders without mentioning a structure that is the signature of the genus—and very conspicuous besides. This is the stabilimentum, a zigzag band of silvery ribbon silk built at the hub of the web. In some species it is a perpendicular line passing through the hub, in others a four-armed Saint Andrew's cross. Young spiders of all *Argiope* species build a beautiful stabilimentum of concentric elements that looks like a lace doily. What are these structures for? There are at least as many answers as there are scientists who have thought about the phenomenon. Stabilimenta have been described as camouflage devices or as shields that protect the spider; as reinforcement to strengthen the hub; as absorbent areas that catch drinking water; as warning devices to keep birds from flying into the web (like white paint on new windows); and as stabilizing devices like guy-ropes. The answer may be that they're multifunctional.

Certainly not all the spiders of the same species, in the same field or wood, will build a stabilimentum on any one day, and those that build it will not necessarily build the complete, perfect stripe or four-part cross. The definitive experiments and observations are yet to be made. The only limit is that of ingenuity. Maybe you are the one who can find the answer.

Even if you cannot, spiders are worth much more than a casual glance. They are something to be admired as miniature systems of almost incredible perfection and beauty. We need to approach the entire living world this way; in the last analysis the "creepy-crawlies" turn out to be objects of wonder. They are as irreplaceable as Rembrandts.

This extreme close-up reveals the structure of the stabilimentum, whose function is a matter of debate.

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By Doug Stewart

One shutterbug wears more than meets the eye

The world's greatest collector of cameras, Jack Naylor has a passion for rarities and a special flair for the clandestine

The young woman in the pink skirt sits alone on a park bench, eating her lunch and reading a book laid out beside her. Barely five feet away, a heavyset man in a blue blazer gazes intently at the facade of Boston's Faneuil Hall through an antique monocular. The woman looks up from her book, glances at the man and goes back to her book. She doesn't notice the tiny lens in the side of the monocular, nor does she hear the click of the shutter as the man captures her fork in midflight.

The man in the blazer is Thurman F. (Jack) Naylor, camera collector extraordinaire, and he's showing me some of his treasures in action. Though he owns everything from rare daguerreotype cameras to prototype Polaroids, today he's demonstrating a few items from his arsenal of concealable cameras. Our pockets are stuffed with them: a turn-of-the-century pocketwatch camera, a leather-bound-book camera, a cigarette-pack camera, even a wristwatch camera.

A passerby catches on to our caper, having noticed the large hole scooped out of the side of an enormous new telephoto lens dangling from Naylor's neck. "Excuse me, is that a right-angle lens?" asks the man, a businessman in his 40s. Naylor assures him that it is. The businessman is clearly intrigued. Naylor reaches into his coat pocket and produces a pair of antique binoculars with *two* hidden lenses on one side. "Now this one," he tells the man, "takes right-angle pictures in 3-D." Naylor has brought along a copy of the original 1896 ad showing a Victorian beachgoer scanning the horizon for ships while snapping a pair of bathing beauties to his right. The businessman seems ready to offer him cash on the spot.

If there's one thing that Jack Naylor has learned in his explorations of the history of photography, it is that old ideas never die. Good or bad, they just keep turning up in camera catalogs. (The deceptive telephoto is available by mail order for $34.95, and he knows an outfit in Germany that will sell you a finely crafted wristwatch camera, complete with quartz clockwork, for $2,500.) And good or bad, old or new, if a camera interests him, he buys it. During the past 30 years, he's encountered cameras that interest him at a rate of four a week. The resulting accumulation is indisputably the most comprehensive collection of cameras in the world.

Naylor's collecting began humbly enough. As a young mechanical engineer and amateur photographer in the late 1940s, he started buying antique-camera patents for 50 cents apiece. "I wanted to see why some of the designs were so incredibly good and others so incredibly bad," he says. For the designs at either extreme, he took to acquiring the cameras themselves. Soon he was buying five or ten cameras a year.

In 1960, he and a partner took over the management of a struggling automotive- and aircraft-parts company. By the time he retired in 1985, the company had plants in 12 foreign countries. Naylor used to visit the major plants every year, the others every second or third year—"unless they were having a revolution." On each trip (including 33 to Japan) he used his spare time to hunt for cameras. He'd often leave Boston with one suitcase and return with two or three.

It looks like the world's largest camera shop

Naylor bought old cameras, new cameras, little cameras, big cameras—any camera anywhere that in his estimation had earned a niche in photographic history. The display area for his various finds grew from a few Sears, Roebuck metal shelves to a 4,000-square-foot, climate-controlled, electronically guarded, underground museum beneath the Naylors' home in a suburb west of Boston. The Naylor Museum of Photography (open by appointment only) holds close to 6,500 cameras along with thousands of rare photographs, photography books, letters and an assortment of related paraphernalia.

At first glance, the museum calls to mind the world's largest camera shop. Cameras of every description

For portrait, Naylor donned 17 spy cameras, some in pockets, six visible; all appear on pages 118-19.

Color photographs by Richard Howard

Harold B. Lewis

Panoramic photograph of the Naylor Museum was taken with a Hulcherama—a modern, motor-driven camera that is mounted on a tripod and revolves 360 degrees, recording the image on ordinary 120 film.

jam the immaculate glass shelves rising from floor to ceiling on all sides. Resting safely on the floor is one of probably the world's heaviest cameras (642 pounds), a huge Kodak reflex camera with three lenses, built to take multiple photographs—of the first H-bomb blast at Eniwetok. Nearby sits a camera from a U-2 spy plane—so sharp that from 13 miles up it records ground details four inches apart. Everywhere wooden cameras on carved tripods stare blankly at visitors. There are cameras used by photojournalist Margaret Bourke-White and strobe pioneer Harold Edgerton, rare prints by Ansel Adams and Julia Margaret Cameron, even George Eastman's suicide note.

Not all the items on display have so clear a place in camera history. Naylor leads me through the labyrinth to a multicolored row of tiny Coronet Midgets. "These came in cereal boxes for the British coronation in 1936," he says. Naylor has all five colors: rose, walnut, olive, blue and black. "Blue is always the hardest to find." Farther down the aisle, he points out a plastic Charlie Tuna camera next to a Charlie Tuna radio and a Charlie Tuna lamp. "It may be the only set in America," he says. He's laughing, but he still took the trouble to acquire it.

Among Naylor's strangest finds is his pigeon camera. Called the Doppel Sport, fewer than ten are known to have survived World War I. The camera is strapped to the underside of a homing pigeon that

Yankee Multiplier, 1870, has nine lenses and device in back that moves a plate to take 525 tiny tintypes.

At far left is a case of the earliest photographic equipment; toward center is replica of 1860 studio (with mannequin); right of center is room with first movie projectors; far right are miniature spy cameras.

Tintype taken by Yankee Multiplier is set into jewelry; another use of camera's product was on calling cards.

has been stuffed for exhibition. The German Army, much to the amusement of the French Army, tried to use these cameras for aerial surveillance. A spring-loaded timer triggered the lens, which swept from one side to the other to take a single panoramic shot of whatever lay below. "It took me 15 years to find one," he comments. "I think the others all crashed."

Naylor is clearly a man with a well-developed obsession. A courtly and prosperous 66-year-old, he abhors small talk unless the subject is photography. He used to constantly visit dealers, auctions, flea markets, antique shops, camera shows and private homes to fill gaps in his collection, gaps that to an outsider can seem narrow indeed. "Now I just wait for the phone to ring," he says. "There are about 30 to 40 more cameras that I'd like to get before I toss in the towel." But he admits that acquiring them is not very likely to dull his appetite for more. When he finds a camera on his must-have list, he usually gets it. Some of the biggest photographic auctions are in Germany, for instance. "I can't speak German," he says. "If I want something, I just raise my hand. I keep my hand up until I get it."

Naylor takes particular pride in his acquisitions from the earliest days of photography, when cameras were huge and taking pictures was an unwieldy enterprise. He and two fellow camera buffs once went so far as to shoot and develop a daguerreotype photograph

during a camera show in Michigan. "The only 'darkroom' we could find was my bathroom at the hotel," he recalls. The developing chemicals—mercury and iodine—were not only corrosive but lethal. As the three of them worked, the room grew hot and increasingly fume-filled. Chemicals began to spill. Naylor broke the toilet seat while struggling to open a stuck window draped with a blanket. "We ruined the floor," he says, "and we had to buy a new toilet seat and replace the floor."

Some of the early "portable," wet-plate cameras, used by landscape and travel photographers in the mid-1800s, were little more than darkrooms on wheels; they resembled steamer trunks and were carted about the countryside on wheelbarrows. With the introduction of dry plates, processing could be delayed and cameras became smaller and tripod-free. By the 1880s, detective cameras were the rage. These were mostly compact, nondescript wooden boxes that were simple to operate and had neither cloth hood nor protruding lens. Detectives may have used them, according to Naylor, but the real market was well-to-do amateur photographers interested in snapping women on the street to whom they had not been granted an introduction.

Once the public caught on to the ruse, manufacturers offered more imaginative disguises, bringing out hat cameras, cravat cameras, even hot-water-bottle cameras. Naylor owns a rare 1886 vest camera with a lens that fits through a buttonhole. "The instructions tell you to expand your chest and pull in your gut when taking a picture, to avoid getting too much sky," he explains.

Variations on the detective camera continue to turn up, some more clever than others. Among the latter in Naylor's collection is the Doryu II, a Japanese make of the mid-1950s that looks remarkably like a Colt .38 automatic. The Doryu even packs a .38 clip in the

CharlieTuna camera was for canned-tuna promotional campaign. Naylor has a matching lamp and radio.

Tiny Coronet cameras of Bakelite came in British cereal boxes to mark Edward VIII's coronation in 1936.

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PERFORMANCE

Doppel Sport Pigeon Camera has spring-loaded timer; Germans "flew" it in World War I to spy on French.

Hidden in makeup case, 1926 Photo Vanity camera came with accessories—powder puff, lipstick, rouge.

handle (for flash "bullets"). The picture-taking part is contained in a small attachment near the muzzle, which only makes the device appear more sinister, as though it were equipped with some kind of silencer or poison-gas dispenser. "No one bought the bloody thing," Naylor tells me as I carefully squeeze the shutter-trigger without pointing it at my host. "Who's going to stand still and let someone point *this* at them?" he asks. The merchandiser's loss, of course, is the collector's gain.

Naylor learned firsthand of the Doryu's impracticality the day he bought it. An acquaintance in Iowa called to offer him the camera, provided he appeared immediately with $1,200 in cash. Naylor grabbed an empty briefcase, stopped at the bank and caught the next flight to Des Moines. He was on his way home a few hours later with the Doryu in his briefcase when an airport security guard noticed the outline of the camera on the x-ray screen. "The young lady was screaming 'Gun!' I was saying 'No, camera,' but it was a waste of time," Naylor recalls. Armed men converged from all sides. He was frisked, led away and interrogated for more than an hour by a succession of state policemen. Finally, thanks in part to the snapshots of his museum that he carries with him at all times, he was let go. But the police insisted that the camera travel to Boston in the custody of the pilot.

If the Doryu was impractical, a number of other undercover cameras were both ingenious and utilitarian. Visitors to the museum are invariably drawn to the case containing modern spy cameras. There is shelf after shelf of them—tiny, quiet cameras that often fit in the palm of one hand. On display is an original 1937 Minox, a still-popular camera barely bigger than a pack of chewing gum, used by both spies and self-conscious tourists. There are cameras disguised as matchboxes, cigarette lighters, fountain pens and rings. In a satin holster sewn to a black lace garter is a rare Japanese Petal camera from 1948 (see cover), said to have been worn by female Japanese spies. The *Guinness Book of World Records* deems it the world's smallest marketed camera, but Naylor says undercover operatives today use smaller ones than this. I ask him how he knows. "I've seen them," he whispers. More than that he prefers not to say.

The prize of his spy collection is what appears to be a pack of 100mm, filtertip, John Player cigarettes. The box is black with gold lettering, an exact replica of the English brand, but the box is aluminum and so is the clump of cigarettes poking out from the top. Push down the clump and you wind the film. Press a tiny button on the side and the camera buried inside takes

Doug Stewart is a frequent contributor; he last wrote on the art of demolition in the December 1986 issue.

As Grant Anderson is always quick to point out, when you can throw the hammer 112 feet in Scotland's Highland Games, "You don't need a winning smile to impress the judge." The good things in life stay that way.

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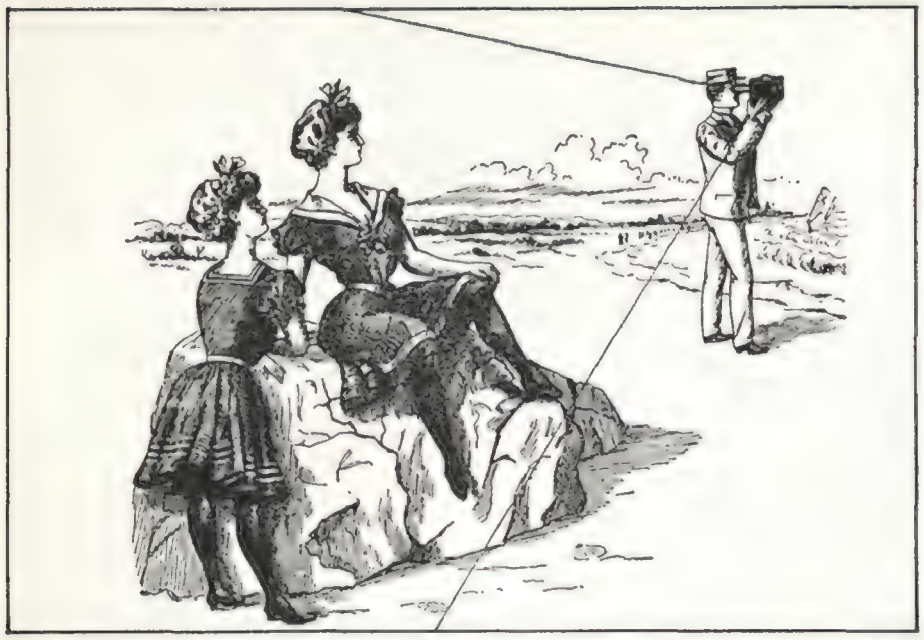

Deceptive Angle box camera of 1890s was advertised as a detective camera, but obviously had other uses.

In Boston market, Naylor uses Monocular Deceptive Angle Camera of 1869 to photograph seated woman.

Naylor's demonstration of right-angle camera made this picture of the woman above as she ate her lunch.

a picture. The box has room for two real cigarettes in case someone troubles you for a smoke. "The Russians made this in the early 1960s," says Naylor, demonstrating the proper one-handed shooting style. "It was used by their KGB agents working in England."

Apparently, no one in the West had ever noticed one until Naylor acquired this in early 1986. Last year, in what passes for a pawnshop in the Soviet Union, he met a well-dressed black marketer with a decidedly un-Bolshevik pompadour. The Russian took his request for rare Russian cameras under advisement. A few months later, a "mutual friend" called Naylor from Manhattan and asked if he'd be interested in a KGB spy camera. "From then on," says Naylor, "I answered every question with 'Yes.' "

The man suggested a rendezvous at a Third Avenue coffee shop. Naylor said fine, he'd be carrying a copy of *Shutterbug* under his arm. At the appointed hour, the two ordered coffee from adjoining stools at the lunch counter, then made their swap. The Russian left without opening his envelope (containing $2,000 in cash) and Naylor left without opening his box. "Sure it was risky," he says now, "but it's a risk you have to take." He has no doubt it's a genuine spy camera. The Russians, he explains, do not make novelties.

Like offering some cheese to a mouse

Naylor's most thrilling find occurred only three miles from his home. A woman in Boston was living in a house that had belonged to her great-grandfather, a professional photographer from 1848 to 1862. His equipment was still piled in the attic and the woman was now selling the house. How much, she wondered, would Naylor charge her for an appraisal of the pile? "That was like offering a mouse some cheese outside the trap," he says. By the light of a single bare bulb, he made out a dusty stack of disassembled cameras nearly six feet high. He returned with lights, extension cords and work clothes, and spent the next three days cleaning, sorting and assembling around the clock. "It was like a jigsaw puzzle," he recalls. "All the parts were there." When he was through, he had pieced together nine complete daguerreotype cameras. The world total is barely 100. One of the cameras Naylor assembled, called a Mammoth Plate, turned out to be the largest Daguerrean camera in existence—"the size of a doghouse," as he puts it. He ended up buying seven of the nine, including the Mammoth Plate camera. "I feel like I've been in clover ever since," he says.

Like a proud grandfather, Naylor has added a snapshot of the Mammoth Plate to the stack he carries in his pocket. In fact, to show scale, his 10-week-old grandson appears in the same picture. The camera is by far the bigger of the two.

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A BLENDING OF ART AND MACHINE

Seventeen concealed cameras worn by one well-dressed 'spy' (p. 108)

Minox, 1937, was used as spy camera by both sides in World War II.

Ben Akiba walking-stick camera of 1902 holds film and lens in handle.

The Concealed Vest Detective Camera, 1886, worn under waistcoat, lens in buttonhole.

Steineck ABC wristband camera, a 1949 German design for amateurs, looks good, but pictures were poor.

Camera X matchbox was made by Eastman Kodak in 1944 and used by American spies in World War II; cover was local matchbox, wherever spy operated.

Japanese spy camera of 1950 resembled popular Zippo cigarette lighter.

Private Eye 16mm pen camera was made in Paris in 1950; it takes 18 shots, clips into shirt pocket.

Japanese Pen Camera (really an automatic pencil) was made in 1953 to be a novelty item.

The Doryu II Flash Camera, another Japanese model for the novelty trade rather than the serious spy, has realistic clip that is loaded with flash "bullets."

Italian wedding-band camera, made in 1981 with minute lens, is held in palm of hand.

French Photo Cravate, 1890, with hidden camera set into an ornamental tiepin, was triggered remotely by squeezing bulb in the trouser pocket.

Mechanism of cravat camera (left) has a tiny chain to rotate plates for six pictures.

Sonocon Camera, by Minolta, 1962, unites 16mm camera, transistor radio in a nearly perfect disguise.

Photoret Watch Camera, in the shape of a pocketwatch, was designed in 1893 by William Dickson, Edison's assistant.

Cigarette-pack camera, a Swiss Tessina 35mm twin-lens reflex, was designed about 1960 and used by "spies" in Watergate break-in.

Mackenstein's Photo-Livre, made in Germany, 1888, has camera with 24 glass plates in a leather-bound book.

Jack Naylor attaches tripod to Stereo Photo Binocle Camera made in Germany in 1899, sold as a "detective camera."

Binoca Opera Glass Camera, made in Japan in 1950, is a 16mm camera set between its two lenses; film fits into slot concealed by nameplate (propped up here).

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At the time of Solomon's famous decision, each party had to argue her side of the case before a judge.

By Lionel Casson

Imagine, if you will, a time without any lawyers at all

Civilization flourished in Egypt and ancient Greece with little help from lawyering, but then came Rome and our troubles began

"The Devil makes his Christmas pie of lawyers' tongues," runs an old saying. And down through the ages opinion has run pretty much that way. Yet today, more than ever after the recent Iran-Contra hearings, life without lawyers seems inconceivable. They are ubiquitous—dominating courtrooms, coaching clients inside committee chambers and shielding them outside, starring in plays, movies and television series. Lawyers, you would think, must belong to at least the world's second-oldest profession.

Not so.

Law codes and records of lawsuits going back to before 1500 B.C. make clear that then, and for centuries thereafter in Mesopotamia and Egypt, there was no such thing as a lawyer. Parties to disputes had to plead

Had lawyers and potential clients existed then, the famous judicial moment might have looked like this.

their own cases. The courtroom was generally the yard of a temple; here sat the judges—mayors, councils of elders, priests, sometimes the sovereign ruler himself. The plaintiff simply stepped up and stated his grievance. Then the defendant gave his reply. In the record of a trial held in Egypt in 1375 B.C., we read, "What [the plaintiff] said," followed by "what [the defendant] said." The famous judgment attesting to King Solomon's wisdom came after the parties in the case had each argued her side before him.

People happily got along without lawyers right down to the middle of the fifth century B.C. Then, in the city of Athens, the seeds of fateful change were sown. It happened when learned men, interested in higher education, introduced a new subject into the curriculum. It was called oratory, and dealt with, among other things, logic and the art of persuasion. From the start the *rhetores*, as the professors of oratory were called, found it easy to get students. At the time, Athens was a democracy—except for women, who were citizens but could not vote, and, of course, slaves. It was run by a sort of town meeting. The accepted way for a political aspirant to make a name was by delivering an impressive speech. Mounting the speaker's dais was to Athenian politicians what going on television is to ours, and training from the *rhetores* helped candidates the way coaching from TV experts helps today.

Discharging deadly verbal volleys

For a while in Athens, as everywhere else in the ancient world, parties to a lawsuit still went on arguing their own cases, not only before magistrates but before juries of ordinary citizens. In law as in politics, however, it soon became clear that training in oratory produced gratifying results. Athens' gifted writer of satirical comedy, Aristophanes, a young man when the new subject came into vogue, took a gloomy view of the effects it was having on the ways of justice. In one of his earliest plays, a chorus of old-timers sounds off about what happens in court when they face some whippersnapper who has been through a course in oratory: "We take our stand before the bench. . . . Your youngster opens fire by discharging a verbal volley. Then he drags up some poor Methuselah and cross-examines him, baiting word traps, tearing, snaring and curdling him. The old fellow mumbles through his toothless gums and goes off with his case lost."

As Athenians young and old discovered the effectiveness of oratory in the law courts, the *rhetores* added wile and guile to oratorical technique. Aristophanes' play *The Clouds* satirized their goings-on. His hero is a shrewd old fellow, head over heels in debt, who signs up with a *rhetor* solely to learn how to cheat his creditors. How to be, in short, a "lawbook on legs, who can snoop like a beagle,/ a double-faced, lethal-tongued legal eagle."

Pupils became adept in courtroom moves: raising endless fine points to obfuscate a shaky case, introducing lush references to a jury's wisdom, parading weeping wives and children to generate sympathy. In a play that pokes fun at Athens' court system, Aristophanes has a veteran juryman sum up the situation: "There isn't a form of flattery they don't pour into a jury's ear. And some try pleading poverty and giving me hard luck stories. . . . Some crack jokes to get me to laugh and forget I've got it in for them. And, if I prove immune to all these, they'll right away drag up their babes by the hand."

Later in the play, an Athenian head of household

Illustrations by Arnold Roth

The famous Greek orator Demosthenes, having filled his mouth with pebbles to improve his delivery, wrote speeches to help win a family lawsuit, and then grew so rich he was able to go into politics.

solemnly sits as judge to hear charges brought by one of the family dogs that his kennel mate has stolen a chunk of cheese from the kitchen. The accused climaxes his defense—and wins acquittal—by calling his pups to the stand, all yowling piteously.

In such scenes, Aristophanes has each party speak for himself, just as was done in actual practice; the *rhetor*'s contribution consisted of instruction about *how* it was to be done. Shortly after Aristophanes died, in the fourth century B.C., a specialty arose that left *rhetores* but a step away from what we would call lawyers. Some of them became *logographoi* (speech writers). Instead of merely coaching the prospective party to a lawsuit in the art of delivering a speech, they actually wrote one for him.

Some of the speeches have survived, including quite a few by the famed Demosthenes who, after having filled his mouth with pebbles to improve his enunciation (at least according to highly dubious legend), made his living for a while as a *logographos*. He had good reason. His father, a wealthy manufacturer and investor, died when he was a child, leaving his estate in the hands of three bungling trustees. They so mishandled things that by the time Demosthenes came of age, the property was down to a bare twelfth of its original value. He forthwith enlisted the help of a celebrated speech writer—and sued.

It turned out to be a sort of Athenian Jarndyce v. Jarndyce. Even after the court eventually awarded Demosthenes the total amount he claimed against the chief culprit, a certain Aphobus, it did him little good. Demosthenes moved to sequester Aphobus' property, but the rascal had dismantled his house, moved out all the slaves, put his substantial real estate holdings in others' names and left town. Demosthenes went after Aphobus' relatives, but the case dragged on. He must have recovered something, though, because, upon entering politics, he was able to give up speech writing.

In the suits that Demosthenes brought against his trustees, suits in which he represented himself, he was, no question about it, a lawyer in our sense of the term. And his fellow *logographoi*, too, except that they did not formally represent clients in court, performed the range of services that lawyers generally do. Inevitably, in preparing a client's speech they would enter into the details of his case, suggest what court to sue in, recommend a legal approach, evaluate tactics and so on. We know of one occasion when an Athenian shipper, whose vessels were seized by the authorities in a distant port, sent out a trusted speech writer to represent him; the man handled the whole matter, even taking the case through a local court.

The final step to full-fledged professional lawyering did not come about, though, until Rome moved to the

Classicist Lionel Casson has just finished a book dealing with Rome's trade with the Far East, to be published by the Princeton University Press.

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forefront of history. In Greece, people rich enough to spend time on matters other than earning a living, if they were intellectually minded, went in for poetry, drama, history and philosophy. But law was Rome's forte, even as literature was Greece's, and their Roman counterparts went into law. They became *juris prudentes* (men wise in the law), devoting their lives to study of the law. Over the centuries, the disinterested opinions they gave to judges, to administrators, even to emperors, along with the results of their endless discussions and debates, little by little accumulated into a body of law. Eventually, at the order of the Emperor Justinian in A.D. 528, it was all gathered up and organized into a complex and wide-ranging body of laws, the *Corpus Juris Civilis* (corpus of civil law), that underlies the legal systems of most western European nations today.

Though the law of Rome was largely the creation of these *juris prudentes*, they were not lawyers; they rarely took cases and when they did, they received no fee. Their chief concern was the analysis of the law. During the early days in Rome, as everywhere else in the ancient world, parties to disputes were still pleading their own cases in court. There arose professional assisters, *advocati*, as they came to be called (men summoned to one's side), who provided expert advice for people involved in lawsuits. Then, during the second century B.C., the vital step was taken: in certain circumstances an *advocatus* was allowed to speak on behalf of his client in court. By the end of the first century B.C. they were doing this so regularly that they now were called *causidici* (speakers of cases). A professional lawyer class, which performed a gamut of services for clients and represented them in court as well, had come into being.

At the top of this profession were stars, the ancient equivalents of Melvin Belli and Edward Bennett Williams, who dressed in well-tailored, spotless, white togas (Roman barristers wore these, the formal Roman garb, even as English barristers wear robes). They had at their heels a parade of secretaries and assistants who harangued the bench, with prompters whispering in their ears, and they charged clients enormous fees. At the bottom, the equivalent of today's "ambulance chaser" was the starving *causidicus*, who wore a threadbare, filthy toga, scrounged for whatever clients he could get and accepted whatever they could pay him, in kind or cash. Hear Juvenal, Rome's savage satirist, on the likes of these: "Their honors take their seats and you, you undernourished champion, rise to

Prototype lawyers, known as *rhetores*, grew skilled in obfuscation, jury flattery and the introduction into Greek legal proceedings of weeping wives and their woebegone children in hopes of generating sympathy.

Courtesy of The Asia Society. Photo: Otto E. Nelson

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Some grateful clients would erect equestrian statues to legal heroes, as if they were victorious generals.

speak your piece. . . . What fee does that voice of yours command? A measly chunk of pork, a pot of fish fry, the overage onions they issue as slave's rations and five jugs of rotgut wine."

What brought men to the top was, first and foremost, oratory—the Roman lawyer's prime weapon—the ability to spellbind judge or jury. The acknowledged master was Cicero, whose speeches served as models for centuries. Lawyers being lawyers, Cicero did not always put his eloquence to the service of a rigid pursuit of justice. He once defended a certain Greek poet whose claim to being a Roman citizen had been contested. The only proofs that could be offered were not too convincing, so Cicero glided hurriedly over them and soared into a lengthy and elegant disquisition on the glories of poetry; what a wonderful thing it was to have poets around; and what a particularly wonderful thing it was to have poets like his client around—a poet who, Cicero pridefully added (he was no shrinking violet), had chosen as the subject for an epic poem Cicero's term as head of the Roman state. That did the trick; he won his case. Run-of-the-mill lawyers made such oratorical flights a sort of stock-in-trade, rising to heights in which they would connect their clients' causes with celebrated historical events or figures. The Roman poet Martial, master of the epigram, once entrusted to a *causidicus* a lawsuit of this kind:

> Mine's not a lurid criminal case,
> Or anything of that sort.
> I claim my neighbor stole three goats;
> That's all you need prove in court.
> So why these learned anecdotes,
> About Caesar, Pompeii, Hannibal?
> Get on to those three goats!

Roman lawyers, like so many of their modern descendants, were not overscrupulous about the cases they took; their private feelings were their own affair. As Cicero put it: "We are brought in not to say what we stand by in our own opinions, but what is called for by the circumstances and the case itself."

Cicero frankly admitted, in one instance, that what the circumstances and the case called for in the defense on a murder charge was "to pour darkness over the judges" or, more colloquially, pull the wool over their eyes. Martial has a neat epigram on the unsavoriness of the cases lawyers were willing to handle:

> I took your case; two thousand was the fee.
> The cash you've sent amounts to one, I see.
> Now why is that? I was no good, you say?
> What's more, the verdict went the other way?
> With a case like yours, instead of giving me
> trouble
> For my blushes alone, you should have paid me
> double.

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Where did all the lawyers come from?

Lawyers today are touchy about the public's view of their profession. It was so in ancient times, too.

Inflated fees enabled successful lawyers to live in grand style, with vast villas in the countryside and luxurious mansions in the city. Since homes doubled as offices—there were no such things as office buildings in the ancient world—the architect of a lawyer's mansion not only had to make it handsome enough to impress clients but include ample waiting rooms to accommodate the crowds of them.

Winning a big case brought a lawyer much showier honors than it does today. His flunkies and retainers and those of the client formed up a procession to escort him in triumph from court to home, where they decorated the doorway with the palms of victory. Some clients, in showy bursts of gratitude, would present their legal hero with a statue of himself, even seated on a horse like a victorious general. Visible marks of success, in fact, were absolutely essential to an ambitious lawyer; they were the only way he could attract wealthy clients. "It's the stylish clothes that sells the lawyer," wrote Juvenal. "No one would give even Cicero a case if he didn't wear a ring gleaming with an oversize diamond. The first thing a client looks for is whether you have behind you eight flunkies, ten hangers-on and a sedan-chair and, in front of you, a crowd of the well-dressed. . . . Legal eloquence doesn't often turn up in rags."

Lawyers today are touchy about the public's view of their profession, uneasy because terms like "shyster" and "ambulance chaser" come all too trippingly off the tongue. They came just as trippingly off Roman tongues, too. The *juris prudens*, the legal scholar, supported by an aristocrat's income and scorning fees, pondering knotty legal points and offering disinterested opinions far from the courtroom, earned great honor and respect. The *causidicus* earned cynical distrust in Rome.

"The most salable item in the public market is lawyers' crookedness," the historian Tacitus wrote. "Pretend you purposely murdered your mother; they'll promise their extensive special delvings in the law will get you off—if they think you have money," said another contemporary. And from a satirist, "What does a man need to be a lawyer? Cheating, lying, brass, shouting and shoving." The feeling that lawyers could buy their verdicts instead of winning them was widespread enough for Martial to quip to someone who was making plans to go to court to contest repayment of a loan:

> With a judge to pay off and a lawyer to pay,
> Settle the debt's my advice; much cheaper that way.

In Rome, lawyers took to oratorical extravagance, rising to new heights in defense of their clients.

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TODAY'S CHEVROLET

From left, senior art director Thomas Thompson, producer Will Wright compare takes of a commercial film; video editors Cal Schultz and John Zieman meld the best of audio and video onto one 15-second tape.

By John Pfeiffer

Six months and half a million dollars, all for 15 seconds

As life goes faster and faster, TV commercials are getting shorter and shorter. Making them requires all the art and science of persuasion

A young woman opens a bottle of antacid tablets (a voice intones: "You'd expect it to be a hardworking antacid"). She slowly removes the cap ("You'd expect it to be rich in calcium and sodium-free"), reaches in ("But what you don't expect . . .") and comes up with a glowing top-of-the-sundae maraschino cherry ("is that it tastes so good"). She proceeds to munch contentedly ("Cherry-flavored calcium-rich Rolaids antacid. The relief you want, the taste you desire").

This and a companion commercial are now appearing on your television screen. They represent about half a million dollars' worth of time and talent, the work of 75-odd people over a six-month span, experts at getting you to stop, look, listen and buy. They are employees of the Warner-Lambert Company—makers of Certs, Efferdent, Listerine and other products as well as Rolaids—and its advertising agency, Young & Rubicam (Y&R in the trade), which is currently riding high on the strength of a record-breaking $700 million-plus in new 1986-87 billings. Their mammoth effort was for a brace of commercials featuring a brand-new, cherry-flavored antacid tablet; each commercial

In one television commercial that's now being aired, actor Lynne MacLaren is delighted at finding a cherry. She was put through three auditions, then eight more takes, just to be sure, before she got the job.

lasts just 15 seconds, about as long as it takes to read this sentence aloud.

One more campaign, one more bright, hopeful face in an enormous crowd. For a faint idea of what's going on, you can multiply that effort by 25,000. That's the estimated number of new network commercials appearing on your television screen every year, representing 25,000 nonstop trade wars, 25,000 armies of specialists using the most advanced electronic gear and behavioral science research in battles for bigger shares of the consumer dollar. The challenge is to get the message across forcefully, memorably and, as if that weren't task enough, faster than ever before.

In the dim and distant 1950s when most commercials were little movies lasting a leisurely 60 seconds, you could buy a prime-time minute for an estimated $15,000. A generation or so later, it had shrunk to 30 seconds for $15,000. The length of today's commercials is still mainly 30 seconds, but now that the golden half-minute is selling for as much as $400,000, the quarter-minute is coming on fast. Practically nonexistent a few years ago, the 15-second package of the future already accounts for a third of all network commercials.

The shorter television commercial is no isolated phenomenon but just one example of the acceleration taking place in the business world. The time lag from laboratory to development to marketplace grows shorter and shorter. The tide of new products, some of them differing only slightly from one another, is at the flood.

This acceleration is a phase of human history that dates back 35,000 years to what Randall White, an anthropologist at New York University, calls an "explosion of symbolic behavior. What we are experiencing today," he says, "is a logical consequence of that explosion." It was 35,000 years ago that our human ancestors, who had lived for hundreds of thousands of years with little if any change, suddenly took off. All at once they were using harpoons and spearthrowers, decorating themselves with body paint and jewelry, carving images and painting cave walls, trading over long distances. What they started continues in us at an ever-accelerating rate. During the cruel days of the Ice Age, innovation was a matter of survival for the species—the spear made the difference between starvation and

Photographs by John Madere

Encircled by elaborate lights and reflectors, Lynne MacLaren, with bottle, is touched up between takes.

a full belly, the bone needle the difference between nakedness and warmth. Today, when we devote some of our best talent to the ballyhooing of superficial change rather than the creation of substantive progress, one might argue that our prospects are increasingly uncertain. Even leaders in the advertising world are concerned about the rising clamor for consumer attention. "We don't know whether the future will be ashes or honey," says Bill Thompson, an executive vice president of Y&R and group director of the Warner-Lambert account.

The antacid story documents what it takes to survive in an innovate-or-perish world. The current campaign started with a surprise attack. Until about two years ago, Rolaids had always shared two-thirds of the $300-million antacid-tablet market with its only major competitor, Tums. Then Tums came out with a new commercial featuring a hitherto unexploited benefit, calcium, the standard antacid neutralizer in its tablets. The timing was perfect. Physicians had begun suggesting calcium supplements to meet the recommended amount in the daily diet, a point being stressed by the recently established National Osteoporosis Foundation. Calcium suddenly emerged as a double-duty agent, dietary supplement as well as antacid. Tums sales jumped more than 40 percent, challenging Warner-Lambert's decades-old position as number one.

Rolaids' counterattack was four solid months in the planning. It called for close collaboration between Warner-Lambert, focusing mainly on why people buy antacids, and Y&R, focusing mainly on what antacid buyers are like as people. No one shoots from the hip in this confrontation. "It's a zero-sum game for a larger cut of the market," explains John Walsh, head of Warner-Lambert's American Chicle Division, maker of Rolaids. "Your gain comes out of someone else's hide. Our job is to create real product differences, to put added value into the ad. Just an aura perhaps, but something you can see, feel, touch."

First came the probing, the search for an unexploited exploitable, something like looking for loopholes in a contract or weaknesses in a fortification. What about packing more pleasure into the tablet? Tums had already moved a step beyond the standard peppermint-spearmint-wintergreen choices, offering multiflavor 12-tablet rolls, three each of orange, lemon, cherry and wintergreen, and the fruit flavors seemed ripe for further research.

February: a preliminary survey involving more than 400 interviewees, male and female, in cities across the United States. Warner-Lambert considers their methods and findings proprietary, but did reveal the key

Director Bruce Nadel, in striped shirt, is hidden by camera; producer Wright is behind the dark screen.

finding—Rolaids users, while liking mint flavors, had a very positive reaction to a cherry-flavored product.

April: a second, similar survey comparing real tablets, Tums versus Rolaids, for cherry flavor, with clear-cut results. For all users, Rolaids' cherry flavor had "a dramatically stronger overall appeal" than Tums' cherry flavor.

July: another survey, this time to determine the sex and age of those who would find the cherry-flavored product appealing. The results suggested that women would be particularly receptive.

To help pinpoint the right audience, Y&R turned to its Consumer Insights department (known in other agencies as the research department). The 60-person division, which includes specialists in sociology, psychology, linguistics, nonverbal behavior, economics and political science, has worked out a classification system that divides consumers into groups. These categories give an indication of how, based on their own values and psychological needs, consumers are likely to react to a product.

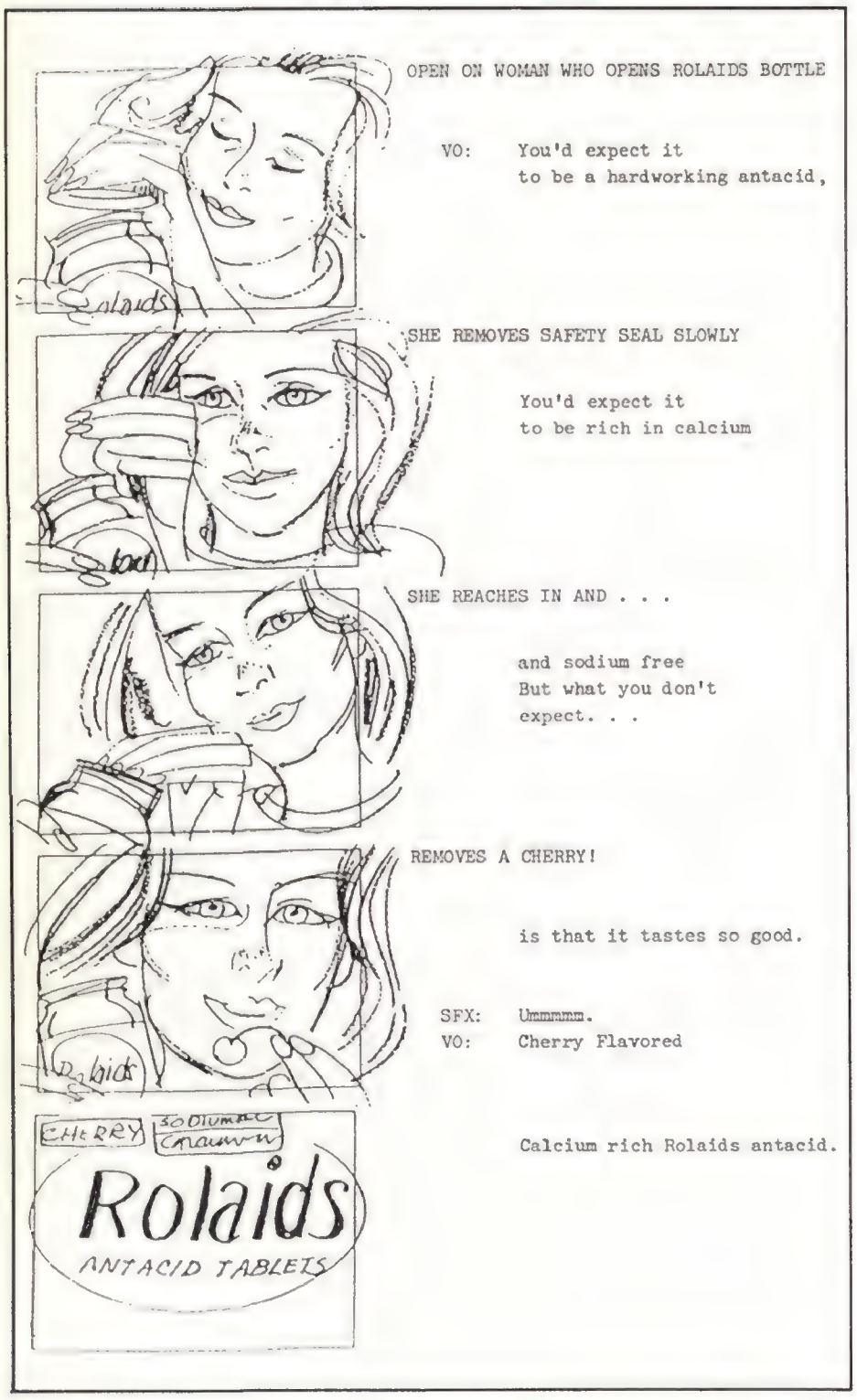
The Rolaids surveys suggested the target group would be what might be called middle-American females who move in limited social circles, are home- and family-oriented and watch a lot of television. Confirmation came from one-hour depth interviews with a dozen antacid-using women 35 and over (the age group especially concerned with indigestion and osteoporosis), observed through one-way mirrors and videotaped —a focus-group session. The net result was a Prospect Profile identifying consumers in this bracket as aware of equal rights for women but preferring "to focus their own energy in managing the home front," "likely to be cutting back on foods that involve health risks," "often suffering" from heartburn and indigestion, and "finding it hard to avoid eating or cooking with onions, garlic, tomatoes and other foods likely to bring on stomach problems."

In the world of media math, 1=886,000

Meanwhile Y&R's Communication Services senior vice president Ellen Oppenheim was busy translating strategy into television schedules, with the aid of some media math. One rating point means that 886,000 households are tuned to a station (one percent of the nation's 88.6 million households, or about 2,299,000 individuals). Placing an ad five times a week on a show with a 10 rating comes to five times 10, or 50 rating points. The Rolaids schedule calls for a mix of soap operas, game shows and other daytime programs (rating about 5 points; costing $8,000 for 15 seconds) and evening news shows (rating about 11 points; $20,000).

The final push, turning strategy into message, involved Y&R's creative team. Think of what has been jam-packed into one innocent tablet, and what had to be jam-packed into one fleeting commercial: antacid, calcium-rich, sodium-free, cherry-flavored, good-tasting. It took some doing to translate each of these points, with emphasis, into attention-grabbing words and images—and all within that murderous time constraint. This is a crucial stage, according to Marvin Waldman, the associate creative director who worked on the cherry commercials with Jean Kondek and Thomas Thompson, copywriter and art director, respectively: "This is where the fun starts for me, where advertising comes alive. This is the quantum leap."

Thomas (last names are not used in the advertising business) figures that the leap required about 30 hours of brainstorming and 50 hours of revisions, both with-


OPEN ON WOMAN WHO OPENS ROLAIDS BOTTLE
VO: You'd expect it to be a hardworking antacid,
SHE REMOVES SAFETY SEAL SLOWLY
You'd expect it to be rich in calcium
SHE REACHES IN AND . . .
and sodium free But what you don't expect. . .
REMOVES A CHERRY!
is that it tastes so good.
SFX: Ummmmm.
VO: Cherry Flavored
Calcium rich Rolaids antacid.
Rolaids
ANTACID TABLETS

Early version of the storyboard outlines the action; VO means a voice-over; SFX stands for sound effects.

in the agency and by the client, to arrive at final approval. He and Jean, microdrama playwrights, came up with a half-dozen storyboards—scripts with rough sketches indicating action. Warner-Lambert selected two: "Face," which ended with the munched maraschino, and "Stack," which ended with the placing of a cherry on top of a stack of tablets. That done, everything was ready for production. Almost. First, there had to be one more survey, a check to make sure the storyboards communicated what Warner-Lambert had set out to do. The Face and Stack storyboards were shown to 20 women ages 45 to 54, all moderate-to-heavy antacid users. Both made the grade.

The time had come for the shoot, the payoff filming of Face and Stack. If the storyboards work, all the research is justified. Jobs and lives are not on the line, but failures are much better remembered than successes. I show up one May morning, 7:30, at the studio of director Bruce Nadel in New York. First of the principals to arrive, via a Bentley from Croton-on-Hudson, he is dressed in gray-striped sweater and white jogging shorts. He got the job in a stiff, low-bidder-gets-the-contract competition against two other directors. The other principal, Y&R producer Will Wright, my mentor and a veteran of 800 shoots, comes in shortly thereafter from Port Washington by Long Island Railroad and subway, dressed in comparatively formal open-collared shirt and work slacks.

Bruce's job: to produce a film as artistically as possible, "to take something that's ordinary and make it extraordinary." Will's job: to get the film done as closely as possible to everyone's satisfaction, and to do it within budget.

Next on the scene is Lynne MacLaren, with four years of acting experience at the Hedgerow Theater near Philadelphia, standby for the star of a comedy that opened on Broadway and closed the same night, now full-time actress for commercials such as Excedrin P.M., Oil Of Olay, Preparation H and Johnson & Johnson's Baby Powder. Lynne is special, chosen from 42 candidates, all "age high 20s or low 30s, attractive, relatable, smart," auditioned at five-minute intervals, two or three takes each, in Y&R's casting department.

Five actors made the short list. They were called back for a second audition, six more takes each: A.S. ("Too pretty, like *Dallas*, a man's woman"), B.P. ("Believable, eyes not very expressive, not quite classy enough"), J.H. ("Exaggerated expressions, looks like she's president of Phi Gamma Gamma"), J.W. ("Silly, don't know why we asked her back") and Lynne

John Pfeiffer wrote about our Cro-Magnon ancestors in the October 1986 SMITHSONIAN. *He is at work on a book showing the continuity of cultural evolution.*

ARRIVE IN STYLE.

With a luxurious Lincoln. And a portable telephone. Both available at Budget. With the American Express® Card.

When business takes you out of town, take off in style. And rent from Budget with the American Express Card.

Rent a luxurious Lincoln from Budget for the same price you'd pay for a mere mid-size car at other firms. Only $39.99 a day.

And at over seventy Budget airport locations, you can take advantage of a special Budget offer when you rent any Budget car. A portable cellular telephone for just $3.00 a day. (Usage at 95¢ a minute, plus applicable long distance charges.)

Between the car and the phone, you'll keep your business on the move. And with the American Express Card, you'll go straight to the top. Because it's not only welcome at Budget. It's welcome just about anywhere you might go.

So if you don't already have the Card, call 1-800-THE-CARD.

And remember, the next time business takes you out of town, take care of business with Budget and the American Express Card.

Simply call your travel consultant or Budget: 1-800-527-0700.

AMERICAN EXPRESS TRAVEL RELATED SERVICES
An American Express company

Budget®
rent a car

*7-day advance reservation required. Offer available at participating locations. Rate quoted is a special promotional rate, is non-discountable and includes a limited number of miles per rental day with a per-mile charge for any excess mileage. Rate subject to change without notice. Rate not available in New York metro area. Rates slightly higher in Baltimore, Washington, D.C., Philadelphia and certain other airports. Refueling services, taxes, and optional items extra. Surcharges may apply for drivers under 25 and additional drivers. Car must be returned to renting location. Normal rental requirements apply. © 1987 American Express Travel Related Services Company, Inc.

At a preproduction meeting, every detail is reviewed: storyboards, props, the actor and her wardrobe.

Wright and Thompson flank a monitor on which one of MacLaren's audition tapes is being played back.

Free-lance stylist Kathleen Hume checks MacLaren's hair between takes; actor, all set to go, holds bottle.

("Comes across fine, intimate into camera, sensitive to nuances, strongly recommended"). A third audition for the winner, eight more takes, made it official.

Now Lynne heads for the dressing room. A peach-tinted silk blouse hangs there, selected after another long "casting" process. A wardrobe stylist spent all yesterday afternoon sizing up more than 160 candidate blouses at local department stores, purchasing a short-list half-dozen for $100 to $150 each. (Five were returned; the one used was donated to a charity.) The dressing room also contains a six-tiered makeup kit chock-full of nail polishes, powders, facial creams, eye shadows and lots of other cosmetic paraphernalia.

Final adjustments are under way at 8:45, stage lights at just the right level, gray-mottled background drape hanging properly, Lynne perched on the high stool. She's examining a Rolaids bottle made especially for the shoot. Just as people may not look natural when filmed under floodlights, product packaging also requires cosmetics to make it look normal on television. The label has been touched up, the red reddened a bit, the small print masked out—a job farmed out to a color-correction studio, one of 33 specializing in such work, which supplied three bottles for a total of $800.

A plastic platform supports the illusion

The crew's prop master has built a "platform" inside the bottle: a piece of plastic tubing glued to the bottle's bottom, it supports the cherry that Lynne will remove. Its height has been calculated to a fraction of an inch. Any lower and she would have trouble reaching in for the cherry; any higher and its stem would show, giving away the illusion.

The prop master is responsible for the cherries, too. His assistant sits at a table sorting scores of them spread out on paper towels, discarding misshapen clinkers, selecting unflawed wholesome-looking globes, drying them off, wiping them with a soft cloth, placing them carefully to the side for takes to come.

It's 9:30 now and the studio is jammed. Fifteen crew members, one account executive, one account supervisor, one product manager and one senior product manager, along with six assorted observers and "creatives" Thomas and Jean. Bruce sits at a $100,000 motion-picture camera.

"Lights up! Roll video! Roll sound! Action!"

Bruce directing Lynne, first take: "Look at the cherry with surprise. Then look at me."

Second take: "A little too aggressive. Don't snap at the cherry."

Third take: "It's getting better. You're still rushing it a bit."

Fourth take: "Very nice. Timing is terrific, but still a little fast, a little curl on your lips." (Aside to me:

This is ridiculous...

Why is it...that no matter what we do...

...we never come out on top after taxes?

Mary and Robert Webb
Ages: 43,42
Two children

Income	
Combined	$83,000

Estimated Expenses	
Income tax	$17,500
Mortgage	$12,000
Food, clothing, Insurance	$21,000
College Tuition	$16,000
Savings, CD's, Mutual Funds	$23,000

Needs
1)Tax-advantaged investments
2)Access to cash
3)Long-term security

Answers
John Hancock Single Premium Variable Life Insurance - offering investment options like: Stocks, Bonds, Money Market, Aggressive Stocks and Total Return Account.

Mary and Rob Webb want to pay less in taxes. Something that isn't easy to do since the recent Tax Reform. But with John Hancock Single Premium Variable Life they discovered it was easier than they imagined. The Webbs now put their premium in their choice of investment options and any money they earn is free from current taxes. Plus, if they need to get at their money, they can borrow at a low interest rate, and still keep a life insurance benefit. If you'd like more information on John Hancock Single Premium Variable Life, including charges and expenses, contact your local John Hancock representative for a prospectus. Read it carefully before you invest or send money.

Real life, real answers.

John Hancock
Financial Services

John Hancock Variable Life Insurance Co., Boston, MA 02117

"You see how complicated a little thing can be.")

Fifth take: "A little more curl on your lips at the end."

Sixth take: "Ah! Still needs a little more enjoyment at the end."

And on and on. The 15th take is a howler. Lynne has the cherry in her mouth but can't pull the stem off. Universal laughter.

Bruce and Will join client and agency executives seated at the back of the studio in front of a remote monitor screen for viewing playbacks. Jean tells how she pictures Lynne's performance: "A mixture of curiosity and a bit skeptical, high expectation. She's got to be sold. Surprise, and then delight at the end."

Back to the camera and to the prop master busily sprucing up cherries. Three action-packed hours later Lynne repeats her performance for the 72d and last time, each time in pantomime and with the same professional aplomb, 72 takes, 72 cherries munched but mercifully unswallowed—expelled 72 times into a convenient bucket. That completes the shooting of the Face ad and everyone breaks for lunch.

A footnote about all those takes. It isn't simply a matter of rehearsing a scene over and over again until everything clicks. That's pure theater. This is partly theater—the search for perfection—and partly politics. You're covering yourself because no one wants the "blame balloon," responsibility for an approach that may bomb when top executives take their first look. So you have a wide assortment of alternatives just in case. According to Will, 70-plus takes is "reasonably normal"; but 100 to 125 takes would be unusual.

After lunch, on to the second commercial, also a 15-seconder, the one named Stack. It involves a stack of Rolaids tablets and an anonymous hand placing three more tablets on top of the stack, one after the other, and, finally, topping them all, a cherry. This sequence is relatively simple, no face and no casting. A face has feeling, personality, identity, and takes considerable directing; a hand must be practically invisible. Bruce had found one that fit the role perfectly: "She has nurse's nails, not too long, not too short, not high fashion. Her hand doesn't call attention to itself. The product is the star on the screen."

Nadel moves in for tight close-up of cherry-topped Rolaids stacked on broken piece of slate, upper left.

Making the tablets look like boulders

This is a tight close-up and Bruce relishes the challenge: "I'll shoot upward—from below—so that the tablets will look like boulders." Nothing is perfect, not even Rolaids, and close-ups reveal minor flaws in the tablets. There are also artistic questions. Should the basic stack, the one on top of which the hand places three more tablets, be made up of three or of four tablets? And should it be slightly irregular, askew, for the human element (Bruce's preference) or a straight column as in a Rolaids roll (the client's preference)? The client wins that one, and the prop master's assistant, working from ten 150-tablet Rolaids bottles, piles them into 4-tablet stacks and glues them together so they won't topple over.

He's also working on the cherries. Even when selected and spruced up, they have blemishes invisible from a distance but as prominent as warts when the camera is only two or three inches away. Fortunately, Bruce's production coordinator had had the foresight to rush-order six-dozen artificial cherries, the plastic creations of a California firm that specializes in fake foods. Problems breed problems. The bodies of the fake cherries look real but the stems look fake, transparent and all exactly alike. The solution: make the best of both worlds, a marriage of Heaven and Earth,

HIS LEGS WERE CRIPPLED. BUT HE CARRIED THE WEIGHT OF THE FREE WORLD ON HIS SHOULDERS.

He was used to carrying a heavier load than most. The braces on his legs weighed fourteen pounds.

But he not only campaigned for and won the Presidency despite his handicap, he won it four times. From his wheelchair, he steered the country through two of the most important events of the twentieth century—the Great Depression and World War II.

Yet in a survey of high school seniors, 52% could not identify Franklin Delano Roosevelt. Many could not identify Churchill or Eisenhower, either.

That's shocking and sad, and we wanted to do something about it.

So General Dynamics has brought a series of dramatic profiles of twentieth century leaders to PBS. And in a mailing to America's high schools, we have offered free videocassettes of our PBS programs featuring Churchill, Eisenhower, LBJ, and Pope John XXIII.

Twenty-two million American students will see them and learn how individuals with courage and conviction can make a difference.

GENERAL DYNAMICS

A Strong Company For A Strong Country

God's stems epoxy-glued to Man's bodies. The result on film is a natural-looking and perfect cherry.

Now for some final finesse. Bruce jumps up and down on a slate slab, breaking off a piece to serve as an interesting "landscape" base for the stack. His gaffer (lighting director) arranges the lights to produce a dark background with a little glow on the side, giving the stack a feeling of roundness. Also, he lays three strips of black tape on the screen of a soft light nearby to create a faint crisscross pattern reflected on the cherry's surface, making it more interesting. This phase requires only 49 takes. The day is done at 6:30 that evening. The entire crew, having worked together as smoothly as a championship pro basketball team, poses for an all-smiles photograph (below).

At the end of a full day's shoot, the entire crew takes a moment for a camera to record the occasion.

Will faces a grueling postproduction schedule after the weekend. He has only three days left to finish his 801st assignment. Early Monday morning he gets together with Jean and Thomas to extract a pair of 15-second commercials, 45 feet of film for each commercial, from the 3,500 feet exposed at the shoot. They spend nine hours reviewing all 72 takes, pulling the six best out of the rolls and looking at them a score of times before settling on the top two.

The next two days include a move to Manhattan's VCA Teletronics, a postproduction facility, and to the ultra-high-tech world of film and video editing—a complex flying-spot scanner, developed by a British film lab to transfer 35mm film to one-inch videotape; a solid-state-logic audio console to mix the best parts of 21 voice-over sound takes onto a single track; and an awesome array of electronics in the video-edit studio. This system, an advanced-image processor, is used for the "final conform," producing the master tapes. An editor, moving his fingers across 100 color-coded keys, plays the machine like a maestro at the organ.

As the Rolaids rotate, the costs mount

The "music" consists of images displayed on a grid array of 12 small black-and-white monitor screens and a large central color monitor. Nearly 1,000 edited versions are stored in memory and any of them can be flashed onscreen and combined in sequence with others. At one point, for example, the problem is to smooth and time the left-to-right rotation of the Rolaids bottle as the label turns into view in the Stack commercial. This is a $1,000-per-hour studio. The machine and its associated equipment must be amortized fast. They cost more than $1 million and they'll be obsolete within two years. All goes according to schedule. The finished cassettes are viewed and approved Thursday morning at Warner-Lambert headquarters in Morris Plains, New Jersey.

While it is too early to assess the full impact of Face and Stack, the cherry-flavor strategy seems to be paying off. But Rolaids and Tums both have top-secret plans ready to unfold at a moment's notice and no one can predict tomorrow's market scores.

In the advertising business, we see competition gone wild—and an impressive mobilization of highly skilled professionals in hot pursuit of novelty. The products may or may not be trivial, but there's nothing trivial about the effort. Every week some 200 new items appear on drugstore and supermarket shelves across the country, each one introduced with suitable fanfare. Since shelf space is limited, however, roughly the same number of products must vanish without a trace. This is the zero-sum game, a survival of the fittest that Darwin never envisioned. The toll is high among people,

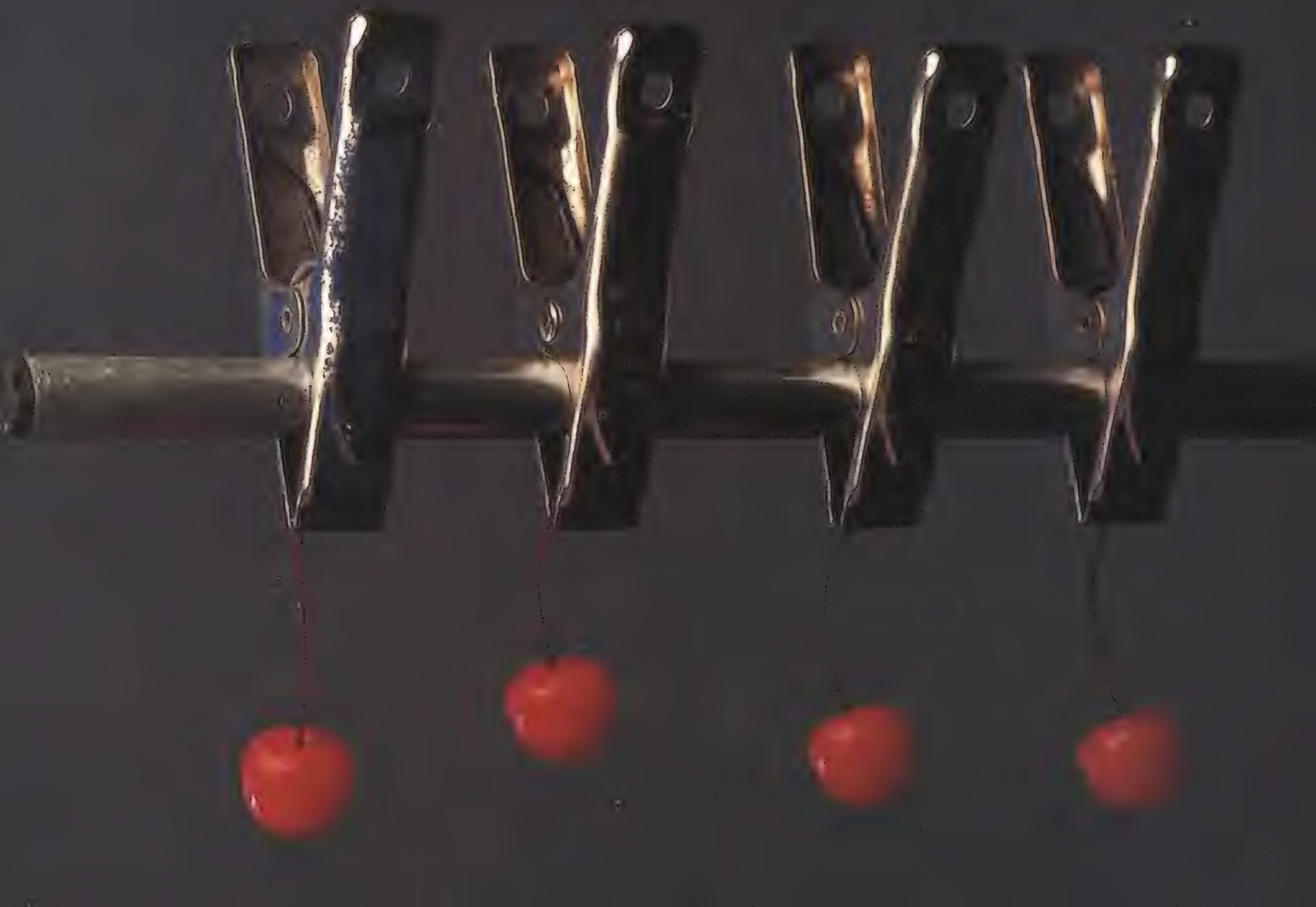
too. Advertising, like big-time sports and warfare, is mainly for the young. There are no official figures, but according to the best guesses of insiders, the average age of the creative types is 30 to 35.

The big question is whether we can afford to concentrate so much talent on this sort of competition. As a matter of fact, there are signs that competition is hurting its own cause. The march of the 15-second commercial proceeds apace against the better judgment of many advertising and network executives. They fear that clutter or, rather, double clutter—more ads per minute and more ad-packed minutes per hour—will kill the goose that lays the golden egg, namely us, the viewers. Our breaking point has not yet been reached, if there is a breaking point (recently foreshadowed by *Max Headroom*'s TV "blipverts," rapid-fire, subliminal commercials that caused a sedentary viewer to explode), but some of our zap-happy offspring are switching channels shamelessly.

It is ironic that the people who make commercials, experts at creating appealing images of products, have been rather less successful at creating appealing images of themselves. The huckster image persists. Yet the industry trend is toward increasing public service. Each year the Advertising Council garners more than $1 billion in contributed time, space and talent from agencies and the media to produce ads for causes like AIDS education, and the prevention of drunk driving and drug abuse among the young. As one person at Y&R involved in public-service advertising says, volunteers are easy to find: "The agencies want to make public-service ads. The best people in the business come knocking at the door for such work."

Meanwhile, it's more of the same—faster foods, faster transport, faster bucks, faster obsolescence. And there's no end in sight. Sixty seconds, 30 seconds, 15 seconds, and the Japanese and Europeans are investing heavily in 7.5 seconds. The beat goes on.

Four real maraschino cherries, polished up by the prop master, wait in isolation for the next four takes. Actor plopped 72 into her mouth, but prudently spit them into a bucket once the camera stopped rolling.



America's best-selling mini-van.*

Your first look tells you Aerostar is a superbly versatile mini-van, with a style all its own. Its design is sleek, modern, aerodynamic. The wind works for it, not against it. With luxurious touches throughout and its special options, Ford Aerostar is America's best-selling mini-van.

New Eddie Bauer style.

This year there's a sporty Eddie Bauer® model with dual front Captain's Chairs, special two-tone paint, unique interior appointments, and more. It's Aerostar with the good looks of the great outdoors!

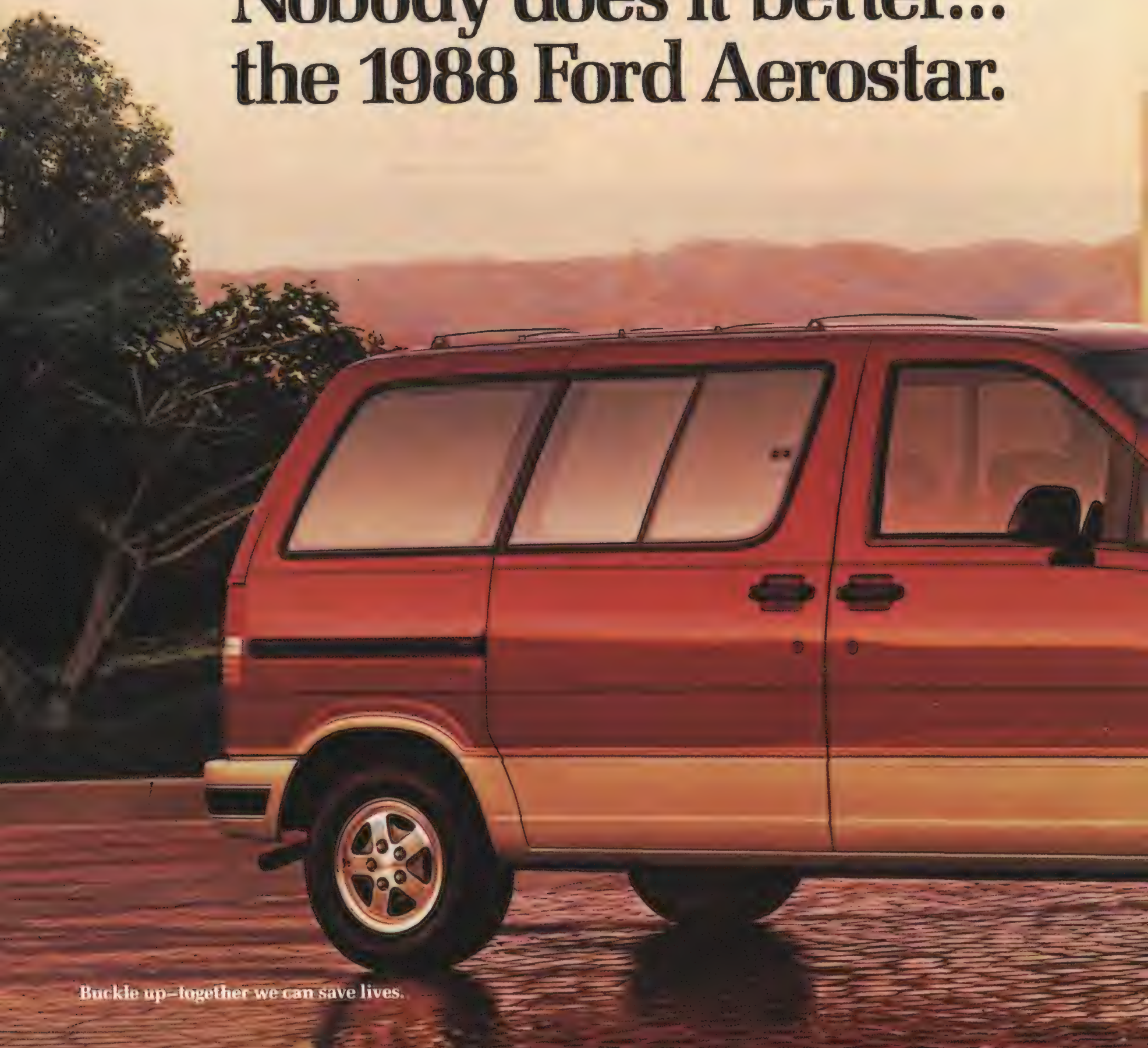
Designed to move you.

But Aerostar's success isn't based only on distinctive looks. Its standard 3.0L V-6 has multi-port Electronic Fuel Injection for easier starting and smooth running. It delivers a spirited 145 horsepower. That's greater than any Chrysler mini-van. And it's powerful enough to tow an impressive 4900 lbs.**

Living room.

Aerostar's advanced styling gives you loads of useable space. It comfortably seats up to 7 people.† Or remove both rear seats, and create 139 cu. ft. of cargo space. You can even convert Aerostar into a sleeper with the

Nobody does it better... the 1988 Ford Aerostar.



Buckle up–together we can save lives.

folding seat-bed option.† All this in a mini-van that's a breeze to handle and park, practically anywhere, even inside your garage.

6-Year/60,000-Mile Powertrain Warranty. Covers major powertrain components for 6 years/ 60,000 miles. Restrictions and deductible apply. Also, participating dealers back their customer-paid work with a free Lifetime Service Guarantee, good for as long as you own your vehicle. Ask to see these limited warranties when you visit your Ford Dealer.

Ford. Best-Built American Trucks...seven years running.

Based on an average of owner-reported problems in a series of surveys of '81-'87 models designed and built in North America. At Ford, "Quality is Job 1."

*Based on manufacturer's reported model year retail deliveries through July 31, 1987. **When properly equipped. Towing rating is reduced by passenger and cargo weight in towing vehicle. †With optional rear bench seat. Seat-bed optional on XL only.

Have you driven a Ford...lately? Ford

Looking like a fallen celestial sphere, the Geode is one of the most popular attractions at La Villette.

Within the geodesic globe is a 360-seat auditorium featuring Omnimax films on 10,760-square-foot screen.

Reflected in the smooth, mirrored skin, made of 6,433 stainless-steel triangles, is the huge museum complex.

By Priscilla Buckley

France has unveiled its spectacular science showcase

After years of political turmoil, the City of Science and Industry at La Villette is open and now draws bigger crowds than the Louvre

Late in 1977, Valéry Giscard d'Estaing, then President of France, set out to create the greatest science museum in the world. The proposed site was at La Villette, a quarter on the northeastern fringe of Paris, on a tract of some 136 acres, where carcasses of the city's old slaughterhouses stood deteriorating. There, where cows and sheep had once been led to the butcher's block, the museum would be established—so technically stunning, it would prove that France at last was an industrial power to reckon with.

Eight years later, on March 14, 1986, Giscard's dream came true, when the City of Science and Industry at La Villette ("the City") was formally opened. The years had been filled with storm and division. But in the end, France had gotten what it wanted: an exhibition center for the general public, dedicated to science and technology and their industrial applications. "It is the technological become cultural," says Maurice Lévy, president of the City. "Today it is impossible to separate the two."

Situated at one end of its vast park, the museum is a technological monolith, smooth and rectangular. Its facade is high tech in the manner of the Pompidou Center (SMITHSONIAN, August 1977) but more refined, made of granite and glass and rickracked strips of blue-painted girders, all reflected in a surrounding moat. Across the moat is an eight-story-high steel globe, the Geode, which mirrors both earth and sky.

Because it is so isolated, the staggering size of the museum is not immediately evident. It is taller than

Photographs by Brian R. Wolff

When kids push button releasing flies into Venus flytrap forest, they see nature is not always benign.

Visitor has flipped a pinball into dome-covered funnel that simulates black hole's huge gravitational force.

Carbon-dioxide-filled bubble will carry voices across a room—even above the conversation of others.

Planetarium can show how stars look from anywhere in Solar System on any day over a 14,000-year span.

the Statue of Liberty and twice the size of the science museum in Munich—heretofore the world's largest. It is full of spectacular, interactive exhibits. There are films and slide shows; weather predictors and sight-and-sound experiments. There are computer keyboards to tap, levers to pull and robots to manipulate. A brigade of 110 young astronomers, geologists and biologists are on hand as well, to succor confused visitors and enrich the presentations.

This kind of approach may be familiar to Americans, but to the French it's downright radical. In France, museums are on the whole more traditional than their American counterparts—as regimented and well ordered as the gardens at Versailles. Exhibits are to be looked at, visitors are to look; interaction between the two invariably sets off alarms. More provocative approaches have generally been rejected on the grounds that French art could speak for itself.

Major companies in France have been invited to launch exhibitions, and this dialogue with industry is what's revolutionary about La Villette. Such top French corporations as Renault, the national electric company and Aérospatial mount their own presentations with the aim of exciting public interest and encouraging an interdisciplinary exchange of ideas. With La Villette's superb research and conference facilities at their disposal, businesses could potentially stimulate a new era of entrepreneurial innovation and creativity in a nation that has been seen, by some, as having dragged its feet.

Even beyond this, Maurice Lévy expects from the museum no less than a modernization of mentality: "Our task is to sensitize the French people to science and technology."

For Giscard's government, then, La Villette was a venture into uncharted territory. Nevertheless, with something perilously akin to abandon, the government plunged into the project with vigor. Generous funding was appropriated. The nation's intellectual elite was convoked. In the closing days of 1977, Giscard tapped Maurice Lévy, a respected physicist and former president of France's National Center for Space Studies, to develop an overall plan for the site.

Lévy is a thoughtful man, an academic by experience and professorial in appearance. He is a lover of art who has browsed through museums all over the world—but until Giscard's request, he'd hardly set foot inside a science museum. Lévy consulted experts and inspected science museums in Washington, San Francisco, Toronto, Munich and Tokyo. Just over a year later, when the Lévy report was placed on Giscard's desk, it was initially received with enthusi-

Priscilla Buckley is a free-lance writer who lives in Paris and writes about European arts and museums.

The inner workings of an ant megalopolis as seen by children who navigate a Plexiglas tunnel to study it.

Most robot zoo inhabitants show off industrial skills but others are just for the enjoyment of visitors.

asm. Adrien Fainsilber was named museum architect.

Everything was set to go—then all of a sudden the project began to unravel. For political reasons, Lévy was *remercié*—a word meaning both "thanked" and "dismissed"—and another director was appointed in his place. For the next couple of years the project floundered. Nobody seemed to have a clear idea of what the museum was supposed to be. Handicapped by chronic infighting and indecision, La Villette was barely limping along when, in 1981, a new Socialist government came to power and issued an unnegotiable directive: the museum had to be finished in time to be dedicated as the European space probe Giotto crossed paths with Halley's Comet in March 1986.

The project was devouring funds at a dazzling rate. By now the plan included not only the science museum but a concert hall, an enormous, six-story theater-exhibition hall and a City of Music (this is the only major section of La Villette that has not yet been completed). The projected price tag was $750 million.

Finally, in the summer of 1983, Lévy was asked to come back. He returned reluctantly, spurred by a sense of duty. "If ever this project fails," he recalls thinking, "I would never be able to forgive myself."

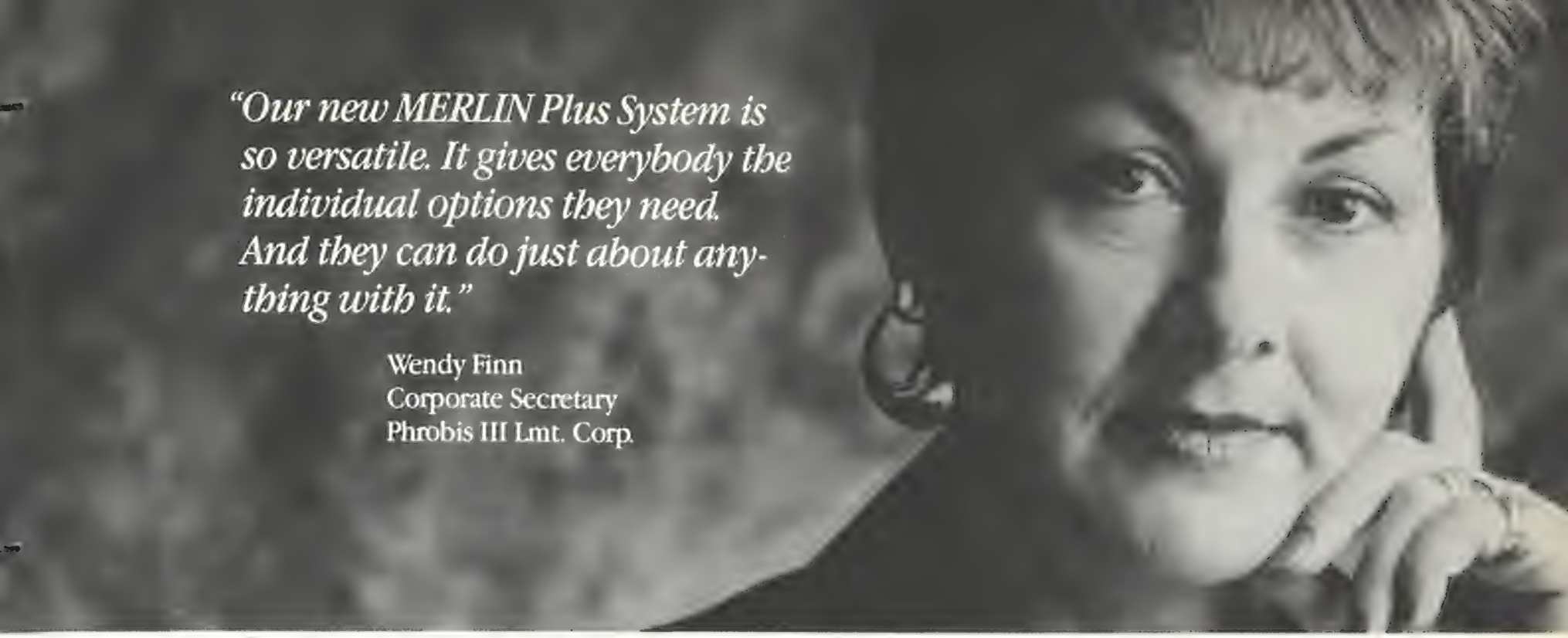
With an army of bulldozers, cranes and technicians, the museum began to take shape. Three years later, it was dedicated on time, with President François Mitterrand and 10,000 others in attendance and the benediction of Halley's Comet shooting overhead. Given the museum's history, it was a miracle it had opened.

Great hall could hold a cathedral

And yet it is impressive. "I detest camouflage," says architect Fainsilber. This is evident from the moment one enters the huge building. Nothing is hidden and the entrance hall is an elegy to infrastructure—an entire cathedral could fit into it; its walls are largely glass. There is a nearly overwhelming impression of light and space. In the roof, two domes, each measuring almost 60 feet across, are equipped with unique, computer-driven mirrors that track the sun as it moves across the sky and reflect its light directly down into the hall. Dummies of astronauts appear to float in mid-air between the upper levels. At the top of the escalators on the second floor, *The Conquest of Space*, an immense painting by Cocteau, marks the entrance to the permanent exhibit, Explora.

Explora is enormous. It sprawls well over 320,000 square feet, occupies three floors of the museum and is divided into four sectors, each covering different themes of science and human endeavor. Each was designed by a different architect, each has its own flavor.

The first is entitled "From the Earth to the Universe," and it is about the Earth and the oceans and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Janus, the two-faced Roman god associated with new beginnings, greets visitors as they enter main hall.

Scientific imagination is theme of this exchange exhibit designed by Italian scientists for La Villette.

outer space, and Man's inquiry into them all. Here is *le Nautile,* a French submersible so advanced that certain details of this replica had to be changed for reasons of national security. France is the world's third leading power in space, and a life-size model of the Ariane rocket's top stage and simulated modules from the space station Columbus are proudly on display.

The highlight of this sector is the planetarium. With an overhead screen covering 6,500 square feet, it is one of the largest planetariums on Earth. Through more than 125 projectors, slides taken with the most advanced electronic telescopes bring the planets of the Solar System down to Earth, complete with Saturnian rings and Martian volcanoes. At the end of the presentation, the sky as it will appear over Paris on the night of the date you visit the museum makes a precocious appearance, studded with 10,164 identifiable stars.

Sector 2 of Explora is called "The Adventure of Life" and includes a small theater where the ultimate drama of a sperm meeting an egg is shown on film. You watch as egg becomes fetus and fetus grows ready to draw its first breath.

Robots raise philosophical questions

"Matter and the Work of Man" highlights natural resources and how we relate to our environment. Here is a zoo of robots, with their distinct personalities so human that one questions where the line between Man and his creations is drawn. Elsewhere, a game called Dispatcher places you at the command post of a power company to administer to the needs of a country the size and complexity of France. The next time there's a blackout, perhaps you won't be so impatient.

The last of the Explora sectors is "Languages and Communication." Filled with hands-on experiments that probe human senses, expressions and behavior, it is a regular fun house. Read a text on a screen while the motion of your eyes is tracked by computer and illustrated in zigzags of light. Rather than moving as you'd expect—from left to right—they dart about nonsensically. Sit in the cockpit of a jet and feel yourself breaking into a sweat as you narrowly avoid crashing into hillsides and houses. In reality, of course, you are sitting still; a sophisticated computer furnishes the clues that are deceiving your senses.

For a visitor to tour all of Explora, say museum guides, would take 32 hours. Yet there is still much more at the City. There is the Inventorium for children and an ultramodern documentation center, the Médiathèque, that provides computer programs, videos and printed material for scientific experts and amateurs. The museum maintains large temporary-exhibition spaces for top companies—generally French—to show new products. For the privilege, businesses

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The eight-story-high Geode looms large when seen through the huge girder-framed windows of the City.

pay high fees, a large part of the City's revenue base.

The most spectacular and likely the most popular attraction of all at La Villette is the Geode. This geodesic globe, rising alongside the southern facade of the museum, is beautiful—radiant with reflected daylight, it looks like some celestial sphere fallen to Earth. Adrien Fainsilber designed it; the 6,433 triangles of stainless steel that constitute its skin are so precisely positioned that when the last piece was put in place it fit with barely a millimeter to spare.

Inside, a film auditorium holds as many as 360 people—and the world's largest hemispheric screen. Built at a cost of $1.7 million, the Geode features a special film system called Omnimax that shows movies just like those seen with the National Air and Space Museum's Imax system (SMITHSONIAN, June 1985). Wherever you are in the steep rows of seats, the 10,760-square-foot screen and the sound from 12 state-of-the-art speakers surround you. When the camera swoops over Niagara Falls or down to a scarlet stream of molten lava, it is hard to believe you're not going with it.

Despite all the good news, there are problems still to be overcome at La Villette. Too weighty a portion of exhibits hinges on computers, and after a while the procession of keyboards and screens seems endless. And the museum's black-and-yellow "out of order" stickers taped across screens gone black are an all too common sight. Elsewhere, there are signs saying simply, "This game has been a victim of its own success."

Yet in the year since it first opened, more people have visited La Villette than have gone to the Louvre. Despite outbreaks of terrorism in Paris, the mud of a park under construction, unprecedented cold, and transportation strikes, 3.5 million people entered the City—95 percent of whom said they'd return.

There will always be something new to see. With an annual budget of about $100 million, one-tenth of the permanent exhibit is renewed each year and the temporary shows are constantly changed. Future exhibitions will be dictated by the interests of visitors.

The author of it all, Maurice Lévy, appears pleased—but weary. The 65-year-old administrator has fought more than his share of battles to set the museum on its feet and recently decided to step down from the presidency, with the conviction that his task is done. "The museum is now 80 percent complete," he says. Then he obviously chafes at his own statement. "No," he adds, planting his fist on the table. "I don't accept the idea of a complete museum. We will *always* be changing. We will *always* be discussing new projects."

The time is 6:44 according to this clepsydra, where the water level indicates minutes (right) and hours (left).

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Note: actual picture un-simulated.

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was hard enough.
impossible.

By Frances Maclean

'We will confound the calumniators of our race. . . .'

Repairs to his huge fortress and stately palace, and Haiti's new elections, bring Christophe's ambitious reign to mind again

Christophe wore a gold star for 1816 portrait, with clothes like those of George III, whom he admired.

As the bony-backed horse rounds the final curve in the mountain path, the "Prow" of the Citadelle rises out of the mist like a ghost ship lost at sea. If it were an apparition, it would retreat and fade as it is approached. Instead, it gains mass and definition. As tall as an ocean liner and as wide, Citadelle Henry of Haiti is among the largest fortresses in the world.

"Careful when you visit the Citadelle, Miss," warns one of two guides (one to pull the horse and one to push). "King Henry is said to have marched 200 soldiers to their deaths off one of the batteries and their angry spirits want revenge."

The Citadelle was built in the early 19th century to protect Haiti, then an infant nation of former slaves, from European invaders. Its construction became the obsession of King Henry Christophe, a black man who ruled from 1807 to 1820. Given his times and circumstances, that rule was, and had to be, authoritarian in the extreme. Christophe was a harsh monarch. But many of his aims and programs were enlightened, and in a country fated to poverty and political upheaval, the legend of Christophe has become, in its scope at least, almost Arthurian.

The Citadelle was never finished; work stopped when Christophe, too ill to resist a coup d'état, committed suicide. Until ten years ago it stood in ruins, of use only to tourists, until an internationally funded restoration and preservation project rescued it from the destructive collaboration of climate and time.

Today Citadelle Henry stands as a monument to the first and only occasion when slaves revolted against colonial masters to found, and hold, their own nation. UNESCO includes the fort with the pyramids of Giza, Chartres cathedral and the Acropolis on its World Heritage List. Smithsonian's Traveling Exhibition Service is circulating (through December 1991) a panel show on the history of the Citadelle and Haiti.

Outside the Citadelle, the other guide traces a finger along the mortar as he repeats an old and dubious tale: "It was mixed with blood to quicken the hardening," he says, keeping an eye cocked for reaction. Inside, cold and immense strength emanate from the walls, 16 feet thick. Christophe was nicknamed the Builder King because he believed that erecting magnificent buildings would give the new republic stature among older and more powerful nations. "If we could lay our hands on things we have made, monuments and towers and palaces," Christophe wrote as

Partly restored Citadelle, Christophe's greatest fort, dominates a jungle peak 2,600 feet above the sea.

Photographs by Antonio Marcelli

Soldier-statesman Toussaint Louverture, the "black Spartacus," did most to free Haiti from France.

Heavy cannons face mountain passes leading to the fort, ready for a time when France might again attack.

a new monarch, "we might find our strength and our pride in terms white men as well as black men can understand." He built palaces, schools, hospitals, theaters and fortresses until his people would build no more. Of all his projects he loved the Citadelle best.

At the Citadelle Christophe's spirit is everywhere: in the quarters where his 2,000 soldiers billeted (there is room for 5,000); in the kitchens and storage rooms; in the powder magazines; in the hospital; in the elegant shell of the governor's palace; and in the galleries where cannons captured from the French long ago now sit in silent rows. Because the Citadelle has a large collection of cannons, it will soon be designated a museum of armaments and military architecture. The five-story main structure is built around a courtyard, a French 18th-century concept. The designs for arches, vaulted ceilings and an elaborate aqueduct system—including a toilet flushed by rainfall—are similar to those used by the Romans. The

Tons of powder and shot were stored in magazines, most of it for long-barreled guns like these.

multitiered cannon batteries represent, however, state-of-the-art 19th-century innovation.

Restoration has been a detective's game because no architectural drawings were ever found. "We have had to make the building speak to us and tell us its secrets," says Haitian architect Albert Mangones, who as head of the restoration project had to measure the fortress inch by inch before work could begin.

Although Christophe erected the grand structure in part to secure his country's place in human memory, he also created what may be the very best place in the Americas from which to get an overview of history. The top of the jutting Prow battery is often shrouded from late afternoon until midmorning. But as the Caribbean sun slowly burns through the vapor, the view reveals a breathtaking panorama against which a

Frances Maclean, a Washington, D.C. journalist, has in recent years worked on many stories about Haiti.

Map locates Christophe's kingdom (the red area) in Caribbean. Eastern end of isle is Dominican Republic.

vast New World drama was played out. To the left lies the harbor where Christopher Columbus anchored his fleet in December 1492. On shore is the site of La Navidad, the first European settlement in the New World, now under patient archaeological excavation despite riots and disturbances on the island that have led up to Haiti's impending elections. Columbus had officially claimed the territory for Spain and given it a name, Isla Española (later contracted to Hispaniola). He wanted some of his expedition to remain on the island to establish a settlement. In 1493, leaving part of the crew behind, Columbus and the others sailed home nurturing visions of fame and riches.

To the right of the Prow lies the fertile North Plain, setting for one of the more ambitious agricultural projects the world had then seen. With perpetual sugarcane and coffee harvests, it became the most productive colony in the New World, the envy of all other European powers. Spaniards enslaved the island's original inhabitants, Arawak Indians. Cruelty and smallpox (a European import) soon killed so many that African slaves were shipped in to replace them. Their high mortality rate, in turn, created a voracious slave market, revitalizing the Africa-to-America leg of the infamous trade triangle between the Dark Continent, the Americas and Europe. In 1697 France acquired part of the island, renamed it Saint Domingue, leaving Spain more than half—roughly what is the Dominican Republic today. Whether practiced by Spain or France, the world's first major international, interdependent economy had a cunning efficiency; ships carrying slaves from Africa were reloaded in the Indies with sugar, coffee, indigo and cotton before going on to Europe where their cargoes were processed. In

Europe, holds were refilled with local goods, which were then traded for slaves in Africa.

Tortured, starved and overworked, the slaves were also restricted from participating in the comforting rituals of daily life. They could not have their traditional funerals or openly practice folk religion. For years their resentment flared up in sporadic revolts. By the end of the 18th century, abolitionists and pamphleteers with Enlightenment ideas about liberty and justice began arriving from France. In 1791 when the islanders revolted en masse, the hopes of the French Revolution had mixed with repressed, but never expunged, voodoo; it proved a deadly alchemy.

For 12 years blood soaked the North Plain as the rebels fought and defeated France, England and Spain. Haiti endured almost indescribable political and racial passions, with mulattos, who were often educated property owners, sometimes allied with whites against blacks. Three black generals rose to prominence at that time: Toussaint Louverture, the ideological leader of the revolution; Jean-Jacques Dessalines, the warrior; and Henry Christophe, the reconstructionist. After independence in 1804 the territory was renamed Haiti, which means "land of mountains."

Straight ahead off the Citadelle's Prow is Cap Haitien. Before independence it was Cap François, the port capital of Saint Domingue, pulsing with life as the apex of the tricontinental economy. Also called Little Paris, the city was famous for wealth, decadence and exquisite mulatto women. The people who settled Cap François and the rest of the colony were looking for a fast fortune, and life in the Indies was said to be a "race between early riches and early death." "Rich as a Creole" was a popular expression in Europe at the time and many Frenchmen wanting to participate in the fast life loaded their goods in the holds of ships bound for Saint Domingue.

Le Cap's harbor was so large it could hold 225 ships at the same time. First came slave ships, then warships. In 1802 Napoleon's troops anchored there, the initial contingent of a French force numbering 60,000. It seemed impossible that they could not put down the slave uprising before moving on to North America in their quest for an extended empire. But the rebels' tenacious ragtag army, retreating into the hills and often showing extraordinary discipline and generalship (with help from epidemic yellow fever that struck down French soldiers by the thousands), defeated Napoleon's forces.

By 1803 the French were done—their army exhausted. President Thomas Jefferson quickly took advantage of the situation and convinced a morose Napoleon to sell the Louisiana Territory for $15 million, one of the greatest distress-sale bargains in history.

After years of war, the Haitians had won their freedom. But there was constant fear that a French fleet and another army would appear.

Fighting from the hills was the strategy behind Haiti's plan for placing the Citadelle and a score of smaller forts on mountaintops, rather than along the indefensible coast. Each of the three black generals played his part. History credits Toussaint with the idea, Dessalines with starting the project. But it was Christophe's remarkable discipline and durability as

In Haitian painting, Columbus kneels on sandy beach to thank God after landing on the island in 1492.

Among the lesser cruelties inflicted upon slaves were whipping, water torture, burial up to neck in sand.

At crucial battle of Vertières in 1803, Haitians beat the forces Napoleon had sent to reenslave them.

Fierce Jean-Jacques Dessalines created Haiti's flag, supposedly by ripping white out of French tricolor.

a ruler that brought the projects close to completion.

Haiti's landscape was smoldering rubble. The coastal cities and plantations had been burned. As the general in charge of Le Cap, Christophe even torched his own house when he saw French troops come ashore. The economy Christophe would eventually resurrect was in shambles. Early in the rebellion, Spain, Britain and particularly the United States traded eagerly with Saint Domingue, making up for profit lost while France had maintained her exclusive trading rights in the colony.

In his forthcoming book, *Orders from France*, historian Roger Kennedy, director of Smithsonian's National Museum of American History, describes the delivery to Saint Domingue of arms and food, as well as uniforms, during the Presidency of John Adams. In the American War of Independence, the Thirteen Colonies had received assistance at the battle of Savannah from a French contingent assembled at Saint Domingue. It included the young Henry Christophe, who went home with a slight wound.

Then Thomas Jefferson was elected President. He was a Francophile, as well as a planter whose powerful Southern constituents did not want slavery in the United States threatened. Eventually he bowed to the wishes of Napoleon by cutting off trade with Haiti.

The need for a capable leader was desperate. Toussaint had served ably in the name of revolutionary France, but Napoleon considered him too powerful; France wanted to reestablish slavery on the island. A trumped-up excuse was used to arrest him and deport him to jail in France, where he died of cold and undernourishment. With Toussaint gone, Jean-Jacques Dessalines, a savage soldier, declared Haiti's independence. It is said that he made the new Haitian flag by ripping the white panel from the French tricolor, a symbolic end to white domination.

Dessalines' first official act was to declare himself emperor in the best Old World tradition. Then he ordered the Citadelle and some 20 smaller, mountaintop forts built in anticipation of the Europeans' return.

Dessalines never got that fight, though he led a victorious attack against those French who were still established on what had been the Spanish end of the island. Unlike Toussaint, he came to believe that few whites could be trusted and in 1804 ordered the execution of almost all those remaining in Haiti. But within two years he himself was killed in an uprising.

Again the foundering republic boiled with turmoil. Christophe, popularly and logically Haiti's new leader, found himself battling mulatto leaders who controlled both the legislature and economy and who wanted him merely as a figurehead president. A year later an agreement of sorts was reached and Christophe rode off to the northern part of the island, there to establish the Kingdom of Haiti. He left the southern part to a French-trained mulatto leader named Alexandre Pétion.

Pétion's Republic of Haiti was in many ways an enlightened place. He broke up the plantations and gave each ex-slave a small plot. Pétion was easygoing, however. Production sank steadily, disorder reigned and his part of Haiti fell into colossal debt and disrepair. Christophe had more spartan ideas.

He also had much to prove to the outside world. At a ceremony for those who had died fighting French troops, he declared: "We will confound the calumniators of our race by proving ourselves in no respect

Christophe (with cane) directs hordes of workers who toiled for 16 years but never quite completed fort.

inferior in moral and physical powers to the other inhabitants of the Globe, and by showing that we are capable of . . . attaining to an equal degree of improvement and civilization with Europeans."

Because they had come from different African tribes, many of his 170,000 subjects did not speak the same language. Worse yet, they had accepted French racism and a color consciousness so exacting that they made 128 color distinctions. The highest rungs on Haiti's social ladder went to those with the lightest skins. Knowing that little unified his people other than fear and hatred of white men and, perversely, a respect for monarchs and the trappings of monarchy, Christophe became more royal than royalty.

He created a hereditary nobility comprising 4 princes, 8 dukes, 22 counts, 37 barons and 14 knights. He instituted dress codes, especially for his "Thursday levees" when courtiers kissed his hand and afterward made personal requests and reports. Men were to appear in white tunics, silk hose and square-buckled Morocco-red shoes, gilt-handled swords and round hats, although requirements varied according to rank.

Christophe paved a boulevard and built a church for a lavish coronation ceremony, ordering from England a gold sceptre and an eight-foot sword of state for the occasion. To equip a palace, named after Frederick the Great's Sans Souci, and built at Christophe's plantation outside Cap Henry, the new name for Cap François, he sent away to Philadelphia for Duncan Phyfe bedroom furniture. Eventually Christophe had eight palaces and six châteaus, with names like the Cloak, the Necklace, the Embuscade and Plaisance du Tivoli.

Crowned Monarch of the New World

On June 2, 1811, at age 43, Christophe was crowned Henry I, King of Haiti, Sovereign of La Tortue, Gonâve, and Other Outlying Isles, Destroyer of Tyranny, Regenerator and Benefactor of the Haitian Nation, Creater of her Moral, Political and Martial Institutions, First Crowned Monarch of the New World.

Christophe was illiterate, though he dictated and had read back to him for careful editing blizzards of letters dealing with his grandiose plans. Because he kept no diary, much about his origins remains speculation. Even his appearance inspired dramatically varying descriptions. Perhaps the most accurate record is a portrait by Christophe's court artists showing a dignified man of medium height, middle-aged, thick in the belly, narrow in the shoulder, with a kind, intelligent face, dressed like an English gentleman. The only feature distinguishing the painting from any other of the period and genre is the man's "rouge" skin color, a hue which in Haiti was, and still is, supposed to bring good luck.

No one knows whether Christophe was born freeman or slave, or even where he came from. He spoke English as well as French, a skill he did not always admit when negotiating with Englishmen. Dr. William Hodges, an amateur archaeologist who has made an intensive study of the man, believes he was born on British Grenada, which would explain both the English and the spelling he preferred for his name—Henry rather than Henri.

Whatever his origins, the energy Christophe applied to Haiti's economic rebirth had the sweep of a hurricane. His best efforts were marked by rare intellectual power, leadership and vision. He announced to Britain and the United States that he was ready to trade, then saddled the people with a work code so stringent it made the North Plain bloom. Within a few years his part of Haiti was producing sugar at a remarkable rate.

Large plantations were kept as agricultural units. Instead of sharing land, former slaves shared a quarter of what their plantations earned, and had Saturday off to cultivate their own small gardens and market any excess. Sundays were for rest and prayer. But under Christophe's *Code rural*, field-workers had to

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rise for prayers and breakfast at 3 A.M., Monday through Friday. At 4:30 they went to the fields to burn hedges and otherwise tidy up until daylight when the serious work began. From 8 to 9 they took a food break and then worked until noon. After a two-hour rest, they worked until sundown, when they were allowed to go home—but only after more prayers.

Of Christophe's many reforms, reshaping the economy came most naturally. Before joining Toussaint's army he had been a successful hotel manager and plantation owner. He had gone to sea at age 10, signing on as a cabin boy. His ship eventually reached Haiti. Then, in 1780 came his enlistment for the battle of Savannah.

He may have returned to the island with soldier's pay in his pocket, but it was not enough to launch a business. In need of a job, he became patrons' horse handler at the Auberge de la Couronne. Soon he was promoted to waiter, later moving up to manager after marrying Marie-Louise Coidavid, the owner's daughter. He was a devoted husband until the last frantic years of his life, and a conscientious, if undemonstrative, father to his plump and unpromising son, Victor-Henry, and his daughters, Améthyste-Henry and Anne-Athénais.

Christophe was eager for all his countrymen to have a stable domestic life. His next burst of reform was leveled at Haiti's lusty morals. Although he had Protestant sympathies, Christophe used Haiti's official religion, Roman Catholicism, as the foundation for a moral code requiring that all unions be sanctified by marriage. Some of the few lighthearted anecdotes from his otherwise relentlessly serious reign involve the impromptu marriages he performed when, on his rambles around the countryside, he discovered couples living in sin. He dealt harsh punishment for lapses. Once, it was said, he forced an officer's wife accused of adultery to ride through the streets naked with her face turned toward the donkey's tail.

Infractions of any kind provoked extreme punishment. Stealing was punishable by death. Christophe's brutal standards were intended not only to accomplish great things in a short time, but also to raise the general tenor of society, proving that Haitians were more than the collection of thieves and brutes that white nations so often accused them of being. Although he was an exacting taskmaster and given to occasional rages, Christophe also had a reputation for fairness and his tough judgments extended to his own family. Even the Prince Royal, Victor-Henry, once did penal work in the Citadelle.

To enforce the codes Christophe assembled an elite corps of men recruited especially from Africa, all the same height and build. Because they dressed alike in smart uniforms, wags dubbed them the Royal Bonbons. Christophe did his own patrolling, too, and malingerers could expect a thumping on the back with his silver-topped cane as he strode the streets or rode about the countryside inspecting crops.

Perhaps the most useful of all Christophe's efforts concerned education. He believed in it passionately, compensating for his own illiteracy by having relays of readers keep him up to date, and scribes for his large correspondence, which extended to many important men in Europe, including British abolitionist Thomas Clarkson and clerical parliamentarian Bishop William Wilberforce. At great expense, he launched a crash educational program and brought schoolmasters from England and the United States to set up models for a national school system, rigorously taught in English on the latest British pedagogical model, as well as a Royal Academy, a large secondary school, to

Attempting to instill Old World manners, Christophe required his elegantly clad courtiers to attend balls.

In 1820, too ill to rally against his enemies, Henry Christophe shot himself in the heart with a pistol.

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instruct in arithmetic, grammar, history, geography and modern languages. Within two years, 700 children were doing well in elementary school, 200 in secondary.

Fear that the French would return was never far from Christophe's mind. He loved telescopes and had a page follow him everywhere with one wrapped in a linen napkin so at odd moments he could train it on the distant sea. His anxiety was justified. The Treaty of Paris in 1814 deposed Napoleon but extended the slave trade in French possessions for five more years. By then the nearby island of Guadeloupe had already returned to slavery.

Meanwhile, Pétion, Christophe's rival across the border, and his republican citizenry celebrated freedom by partying, interspersed, of course, with battles with Christophe's army. Consequently, regions in the south and west were in desperate economic shape. Pétion schemed against Christophe and intrigued with the French, who, though distracted elsewhere, were anxious to use him as a means of bringing Christophe down. Christophe reacted to such pressures, and to growing fears about his own death, by accelerating his building programs and driving himself and his people harder. He became subject to brief seizures during which he was sometimes murderously violent.

While Pétion's men drank rum in the sun, Christophe's people hauled logs over mountains, pulled stones for the Citadelle up a 2.5-mile path with switchbacks like stair landings, worked man-killing days on plantations. Patrick Delatour, a restoration architect and historian currently at work at the Citadelle, speculates it took as much manpower to build the Citadelle as to build one of the great pyramids of Giza. Like the Egyptians, some of whom fled to the desert, and despite Christophe's visionary exhortations, the Haitians resented the labor and harsh discipline. Encouraged by Pétion, plots against Christophe began to flourish. He circumvented them all.

But when the first shattering blow fell on Christophe in 1820, it was not from his enemies. Attending a mass for the queen's birthday, he dropped to the floor suddenly and could not rise. He had suffered a stroke that paralyzed his right side.

Symbolic painting of Toussaint's betrayal by French reflects Haitian hatred of race that enslaved them.

Hot rum and pimiento liquor

Back at Sans Souci he tried to run the country from his bedroom. His blood scent was in the air, however, and skirmishes at the border increased. His own generals began to fight over who might replace him. In a last effort to regain control, to display the leadership and magnetism that had so long preserved him, Christophe ordered his doctor to rub his body with hot rum and pimiento liquor until it burned. With assistance he dressed and walked outside to gather troops and put down an uprising. He stood before them, turned to mount his horse and fell to the ground face down.

That night word spread quickly that a mutiny had been organized. Shouts of "Liberty! No slavery! No king!" echoed through the palace. One of the few aides who had not deserted him reported Christophe's response: "Since the people of Haiti no longer have faith in me, I know what I have to do."

He called for warm water and clean linen. He

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changed clothes, then said good night to his wife and children. Once alone, he picked up a pistol and put a bullet through his heart.

As the shot sounded, the doors of the palace crashed open and crowds bent on plunder raced in every direction, the few loyal aides gathered the queen and children, rolled the king's body in a hammock and set off into the night up the rocky, winding road to the Citadelle.

The fortress was deserted when they arrived. Work crews and garrison soldiers had fled when they heard from the voodoo drums the king was dead. Weary, desperate to be rid of their burden, the stealthy cortege saw an enormous vat of quicklime prepared for the next day's building. They dumped in the body and fled into the darkness.

Laser-bright sun greets the visitor walking from the shadowy Prow battery into the Citadelle's main courtyard. The guides are waiting on a 4-foot-high lump of mortar that the restoration people have allowed to re-

Sans Souci, the graceful, magnificent palace from which Christophe ruled his kingdom, is now a radiant shell, though considerable work has been done to clean it up and restore walls in danger of collapse.

main because it's "authentic." "Is Christophe buried in there?" she asks. "No," one replies, pointing to a headstone in front of the lump. "He's there." Actually, what vandals and souvenir hunters and the quicklime left of Christophe's skeleton was moved in 1847 to a tomb in Port-au-Prince.

Arguments still flare up in Haiti about Christophe and even today a strict teacher is often called a "Christophiste." Nostalgia for what he represented remains strongest in the north. It is fitting that the grass-roots movement in 1971, which hastened the exit of Papa Doc Duvalier, a tyrant who did not put his tyranny to good use, began in Christophe's land. After he died the country went into a dramatic decline, from which, in a sense it has never recovered, though next month's elections hold promise of improvement.

Before starting the long ride down the mountain the visitor makes sure of the words on the headstone: "Here Lie The Remains of King Henry Christophe. *LE CIVILISATEUR*. He died 8 October 1820."

In its heyday the palace complex included large stables, a hospital, a barracks and a special wing for Marie-Louise, Christophe's queen. After his death it fell prey to weather, looters and earthquakes.

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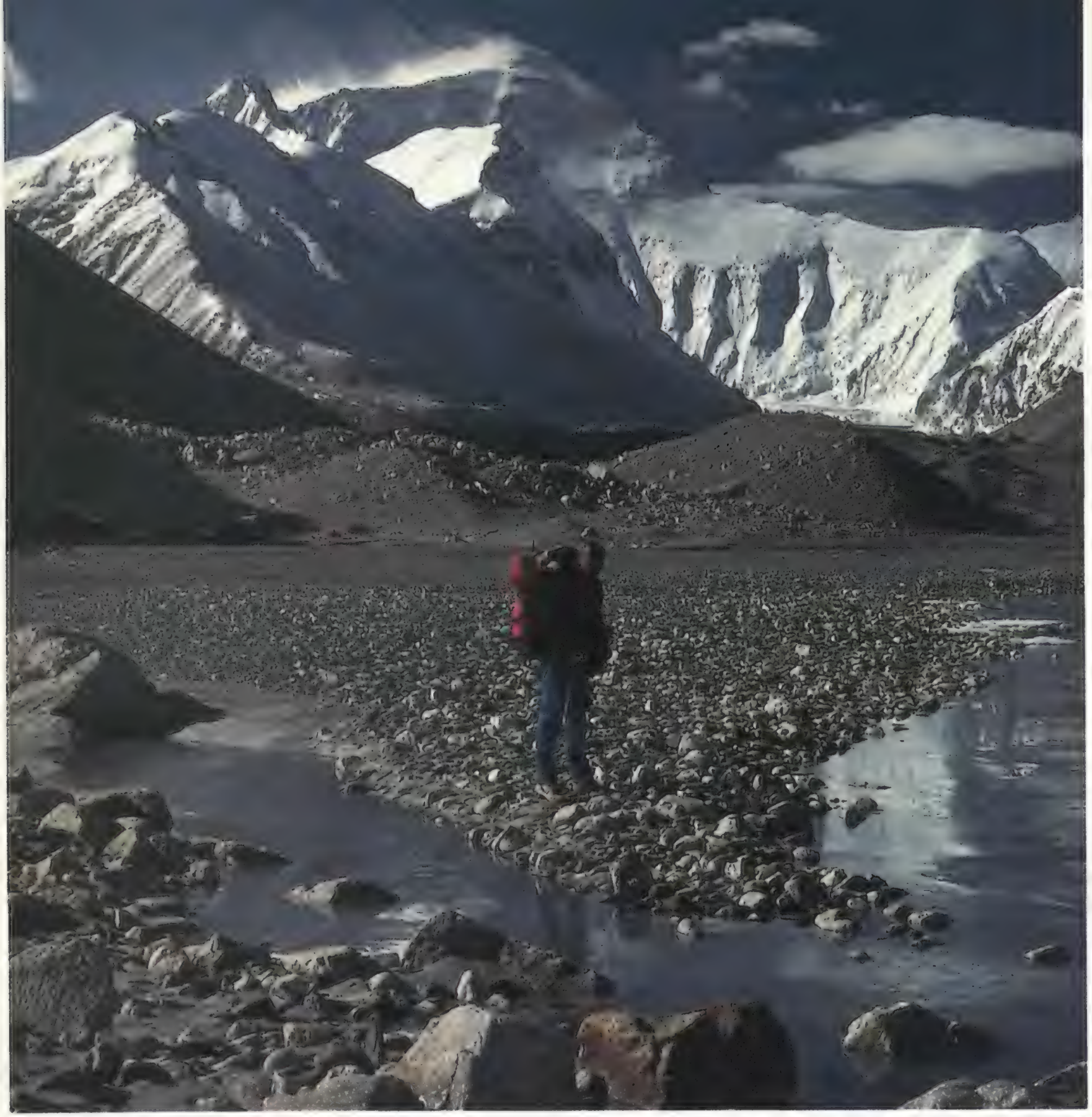
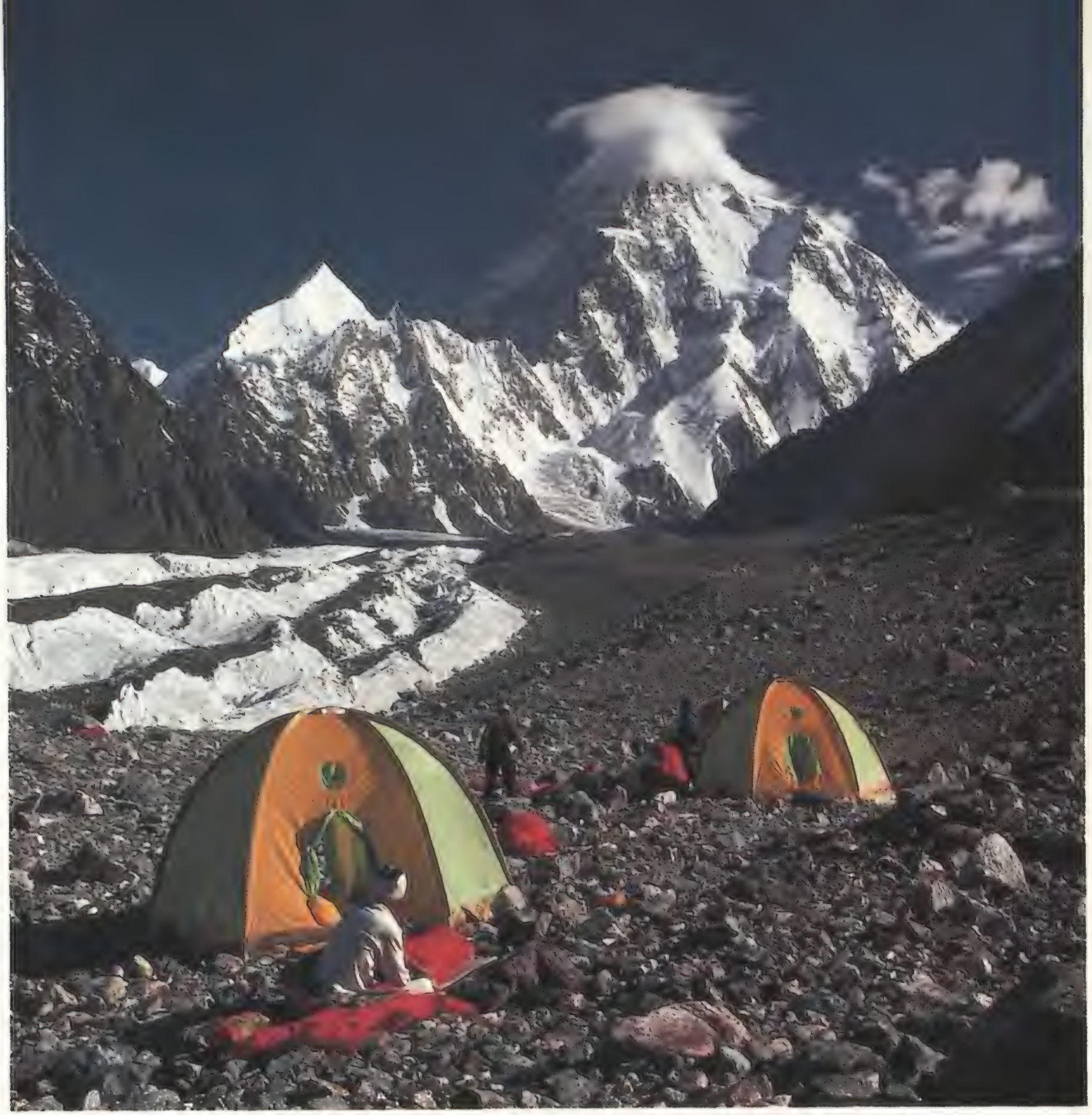


On a clear day in southern Tibet, Mount Everest looms over trekker pausing at 17,200-foot-high "toe" of Rongbuk Glacier. Hillary and Tenzing climbed it in 1953; well over 100,000 hikers have come since.

By Jon Krakauer

After all is said and done, will Everest still be number one?

Mount Everest has survived other claims on its title as world's highest peak, but K2's new challenge is the most scientific yet



About seven miles south of K2, climbers relax near tents pitched on moraine of Godwin Austen Glacier at altitude of 14,900 feet. Everest is far better known but a new survey suggests K2 might actually be taller.

On a hot afternoon in 1852, so the story goes, the Surveyor General of the Great Trigonometrical Survey of India, Sir Andrew Waugh, was sitting in his office, north of Delhi, when a computer rushed in (computers in those days being made of flesh and bone rather than disk drives and silicon chips) and blurted out, "Sir, I have discovered the highest mountain in the world!" The mountain he had "discovered" jutted out of the crest of the Himalaya in the forbidden kingdom of Nepal, and at the time was known only by the Roman numeral XV. By the computer's reckoning, it stood a whopping 29,002 feet above mean sea level.

Using precision theodolites—high-resolution telescopes that measure horizontal and vertical angles—surveyors had repeatedly shot Peak XV from the northern plains of India in 1849 and 1850. But until Waugh's staff got around to computing the data two years later, nobody had the slightest suspicion that Peak XV was unusually high. The surveyors' observation stations were about a hundred miles from the mountain, and from that distance all but the summit nub of Peak XV is hidden by soaring massifs in the foreground, many of which give the illusion of being much greater in stature.

An 1876 map shows the elaborate triangulations involved in landmark survey of India. Starting point was Madras, more than a thousand miles from Mt. Everest and K2.

In 1856, when the computations had been thoroughly checked and Waugh was convinced that no other Himalayan mountain could rival XV in height, he christened the peak in honor of Sir George Everest, his predecessor as Surveyor General. Waugh was unaware that the Tibetans who lived to the north of the great mountain already had several names for it that were more apt and considerably more mellifluous, foremost among them Chomolungma, which translates, "Goddess Mother of the Land."

Before Mount Everest—née XV, née Chomolungma—was measured, the title of World's Highest Mountain had been at various times bestowed upon a number of different peaks. In the 17th and 18th centuries, the prevailing wisdom held that Chimborazo, a 20,702-foot volcano in the Andes of South America, was the highest. In 1809, a Himalayan peak called Dhaulagiri was estimated by a British surveyor to be 26,860 feet high (Dhaulagiri's height has lately been adjusted to 26,795 feet) and thus have a more legitimate claim to the title. But most geographers beyond the borders of India thought such an extreme elevation preposterous and continued to favor Chimborazo until the 1840s, when the title was transferred briefly to Kanchenjunga, a 28,168-foot neighbor of Mount Everest, and finally, in the 1850s, to Everest itself.

Needless to say, once the pinnacle

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Sir George Everest served as Surveyor General of India from 1830 to 1843.

of Mount Everest had been firmly established as the highest point on the surface of the Earth, it wasn't long before men decided that Everest needed to be climbed. Getting to the top, declared G. O. Dyhrenfurth, an influential chronicler of early Himalayan mountaineering, is "a matter of universal human endeavor, a cause from which there is no withdrawal, whatever losses it may demand." Those losses, as it turned out, would not be insignificant. Following the momentous announcement in Sir Andrew's office, it would take the lives of 15 men, the efforts of 13 expeditions and the passage of 101 years before the summit of Mount Everest would be won.

It wasn't until the early hours of May 29, 1953, that a rangy New Zealander named Edmund Hillary and his compact Nepalese partner, Tenzing Norgay, found themselves inching up the final, precipitous undulations of the southeast ridge of Mount Everest. By late morning, Hillary later recorded, ". . . we were starting to tire. I had been cutting steps continuously for almost two hours and wondered, rather dully, if we would have strength enough left to get through. I cut around the back of an-

Tenzing Norgay held flags while Hillary took picture after triumphant climb.

other hump and saw that the ridge ahead dropped away and that we could see far into Tibet. I looked up and there above us was a rounded snow cone. A few whacks of the ice-axe, a few cautious steps, and Tensing [sic] and I were on top." And thus did Edmund Hillary and Tenzing Norgay, at 11:30, become the first men to stand on the summit.

Four days later, on the morning of Queen Elizabeth II's coronation, word of the ascent reached England. "The *Times*," wrote James Morris, the journalist who broke the story and later became known as Jan Morris, the renowned travel writer, "had printed the news in that morning's editions, the vast Coronation crowds

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waiting in London's rain had been told in the dark of the night, the world was rejoicing with us; all was well." The conquest of the "Third Pole" (the North and South poles being the first and second) touched off a ground swell of British pride. Hillary was summarily knighted; Tenzing became a hero throughout Asia. Every almanac and encyclopedia would record forever thereafter that the first men to conquer the world's mightiest peak were Sir Edmund P. Hillary and Tenzing Norgay. Or so it seemed, at least until March 7, 1987, when a brief story, buried in the middle of the *New York Times*, appeared under the headline, "New Data Show Everest May Take Second Place."

The data in question had been gathered in the summer of 1986 by an American expedition to a mountain called K2—a steep pyramid of brown rock and gleaming ice that straddles the Sino-Pakistani border some 800 miles northwest of Everest. After measuring electromagnetic signals broadcast from a satellite, a 57-year-old Seattle astronomer named George Wallerstein calculated that K2—long thought to be 28,250 feet high—may actually have an elevation of 29,064 feet, and possibly even as

Lino Lacedelli exulted after topping K2 with Achille Compagnoni in 1954.

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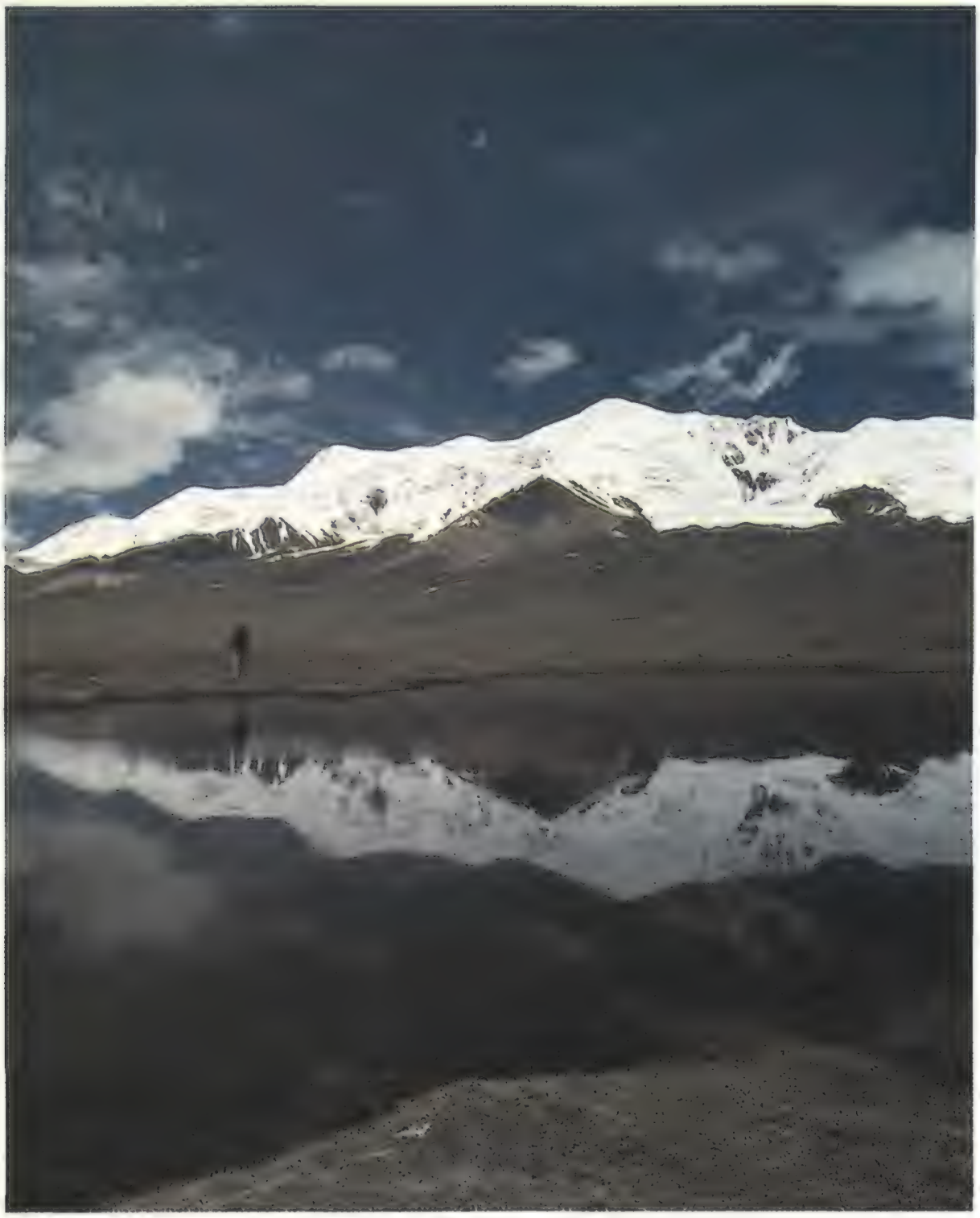

Trekker skirts pond (left) near China's Anye Machin, once proclaimed to be more than 30,000 feet high. Journalist Galen Rowell (above) celebrated his "first" ascent of peak in 1981; it turned out a Japanese team had beaten him.

great as 29,228 feet. A fastidious Chinese survey of Mount Everest in 1975 set its height at 29,029.24 feet.

In the 44 years since Hillary and Tenzing first paved the way, some 200 men and women have struggled to the top of Mount Everest. Thousands of others have failed in their attempts, which involved the expenditure of untold millions of dollars, amputations of dozens of frostbitten toes and the loss, at last count, of 82 lives. All have been convinced that they were pursuing the biggest trophy in mountaineering. But if Wallerstein is right, says Lance Owens, the leader of last year's expedition to K2, "it means that everybody's been climbing the wrong mountain." It also means that the honors for making the premier ascent of the world's tallest peak belong not to Hillary and Tenzing, but to a pair of little-known Italian climbers named Lino Lacedelli and Achille Compagnoni, who in 1954 became the first men to stand on top of K2.

Most expert geographers and geodesists warn that it's a little early for Hillary to hand in his knighthood or for the Italians to start popping any champagne corks. Wallerstein himself has repeatedly cautioned that his observations were "of a preliminary nature," and that it would be a mistake to declare that K2 is higher than Everest until both mountains can be meticulously resurveyed with modern satellite technology. Wallerstein is well aware that recent history does not lack for instances in which men have claimed to have discovered the existence of one mountain or another that surpassed Everest in elevation, only to be proved woefully wrong.

In the early 1930s, for example,

Jon Krakauer reported on Alaska's frenzied herring fishery in the October 1986 issue of SMITHSONIAN.

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there was a flurry of excitement over an impressive-looking peak then called Minya Konka (now Gongga Shan) that towers over the western half of China's Sichuan Province. In 1929, after returning from an expedition across that part of the world in search of the giant panda, Theodore Roosevelt jr. and his brother Kermit wrote a book in which they alluded to claims that Minya Konka "rises more than thirty thousand feet and is the highest in the world." Adding credence to these rumors were the reports of one Joseph Rock, a self-taught botanist with a flair for the dramatic and a loose way with the facts. Rock had visited a monastery at the base of Minya Konka, used a pocket compass and a barometer to come up with an estimate for the mountain's height, and then promptly cabled the National Geographic Society: "Minya Konka highest peak on globe 30,250 feet. Rock."

The Society, which was sponsoring Rock's explorations in China, balked at publishing that figure. Subsequent surveys would show Minya Konka to be nearly a vertical mile beneath Everest's summit. No matter, though, for Rock had hedged his bet by reporting that another peak, 400 miles north of Minya Konka, was also at least 30,000 feet high. This peak was called Anye Machin (now Maqen Gangri), and rumors of its great altitude would persist long after those about Minya Konka had been laid to rest.

The seeds of the legend about Anye Machin were planted by Brig. Gen. George Pereira, an accomplished British explorer who in 1921 embarked from Beijing upon an ambitious journey, intending to trek through Tibet, India, Burma and southern China before returning to Beijing. Pereira died en route but in 1923 he bumped into Rock in the Chinese province of Yunnan and told him of an immense peak in the Anye Machin Range that he was sure would prove higher than Everest.

Milton (Ball-Point) Reynolds (right) looked over maps with pilot Bill Odom.

Rock made the arduous trip to Anye Machin in 1929 and estimated its height from a distance of about 60 miles. Once again he used nothing more than what Galen Rowell, a photojournalist and mountaineer who made one of the first ascents of Anye Machin in 1981, has described as "compass sightings, altitudes calculated from the boiling point of water, and his usual zeal to come up with an astounding figure." He determined that the elevation of Anye Machin was 29,529 feet, some 500 feet higher than Everest.

The speculation about Anye Machin's height flared up again near the end of World War II, when an American C-47 participating in the airlift from Burma over the Hump to Chongqing was reportedly blown far off course. Somewhere in the vicinity of the Anye Machin Range, the pilot climbed out of a layer of clouds at 30,500 feet and, according to newspaper accounts, saw the top of a snow-covered peak looming hundreds of feet higher than his aircraft.

The flight, it turned out, was fabricated by bored Air Force officers looking to play a joke on British war correspondents. (One obvious clue:

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a C-47 could not have even approached an altitude of 30,500 feet.) In 1947, however, when a 55-year-old American entrepreneur named Milton (Ball-Point) Reynolds first read about that "flight" in a book by James Ramsey Ullman, he—like most of the rest of the world—hadn't been apprised of the hoax. What Reynolds did know was that Ullman, in *Kingdom of Adventure: Everest*, had concluded a provocative passage about Anye Machin thus: ". . . if the mystery mountain is indeed higher than Everest, its discovery will rank as the most important geographical event of modern times."

Reynolds—a short, round, balding millionaire with a penchant for publicity—liked to bill himself as the inventor of the ballpoint pen. In fact, it was the brainchild of a Hungarian named Laszlo Biro; Reynolds just introduced it to the American public. Claiming of his newfangled instrument that "It Writes Under Water!" (but neglecting to add that in truth it was often barely functional on dry paper), Reynolds managed to sell approximately 13 million dollars' worth of pens within a year.

In mid-April 1947, accompanied by a 27-year-old crackerjack test pilot named Bill Odom, Reynolds had broken Howard Hughes' around-the-world flying record. No sooner had the considerable ballyhoo from that stunt subsided than Reynolds was struck with an idea for bettering it: he and Odom would fly to China and prove that Anye Machin was the mountain he thought had been spied by the Burma airlift pilots.

Reynolds and Odom embarked for China on February 29, 1948, in a giant, four-engine C-87 christened the *China Explorer*, which had been specially outfitted with state-of-the-art aerial surveying instruments. In Reynolds' entourage was a renowned alpinist and mountain surveyor named Bradford Washburn, recruited from Boston's Museum of Science to ensure that Anye Machin would be accurately located and measured. In the plane's cargo hold were 10,000 gold-plated ballpoint pens that were to be a gift for Madame Chiang Kai-shek. When one of Reynolds' assistants pointed out that the balls in the gold pens were malfunctioning, that they didn't write worth a damn, Reynolds replied, "I know, but the Chinese can't write anyway, and they'll be glad to have them."

The expedition did not get off to a good start. In Beijing, while taxiing to the runway prior to taking off for Anye Machin, Odom got stuck in the mud and then attempted to free the big plane by gunning the engines. As the Chinese and American scientists on board peered out the windows in horror, the right landing gear collapsed from the strain and the C-87 dropped to its belly, rupturing a fuel tank and destroying a propeller.

By and by, the landing gear was repaired and Reynolds and Odom flew to Shanghai to obtain a new propeller that they hoped would enable them to get the expensive aircraft back to the United States. After the propeller was replaced, though, Reynolds proposed to Odom that instead of head-

Odom hugged *China Explorer* after return from Anye Machin "expedition."

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Leonard Clark surveyed Anye Machin in 1949 and declared it world's highest.

ing home, they make an unannounced (and highly illegal) flight directly from Shanghai to Anye Machin without Washburn or any meddling Chinese observers, measure its height themselves and then proceed straight to Calcutta.

On April 2, they attempted the flight but Odom underestimated their fuel requirements. By the time the *China Explorer* neared the mountain, he realized they would have to turn around to avoid a crash landing en route to Calcutta. "At that instant," Reynolds later wrote, "I saw ahead a huge mass of land coming out of the strata of clouds below and reaching right up into the thirty-one-thousand-foot overcast. . . . At last, I was actually looking at the highest mountain in the world!"

The *China Explorer* made it to Shanghai with 15 minutes' worth of fuel left in the tanks, whereupon the Chinese, who were boiling mad, impounded the aircraft and escorted the Americans to their hotel under armed guard. Reynolds was unrepentant. A few days later, he and Odom sneaked back to their plane to attempt an escape. As Reynolds told it, no sooner had they gotten inside the aircraft than an angry "mob of Chinese" approached. As a diversion-

ary tactic, Reynolds hurled his last 200 gold pens out the door. Odom quickly started the engines and they skimmed away under a hail of bullets.

Reynolds returned to America without much in the way of proof that Anye Machin was higher than Mount Everest. To rectify that, in 1949 an American explorer named Leonard Clark traveled to the base of Anye Machin with a crude theodolite borrowed from a Chinese highway bureau and calculated the peak to be 29,661 feet high. "I believe without question," he declared upon his return, "that I have found the highest mountain in the world."

Referring to the deaths of General Pereira in 1923 and Bill Odom in a plane crash at a Cleveland air show in 1949, Clark insisted that Anye Machin was jinxed by a curse that had brought misfortune to "every explorer, flyer, and adventurer . . . after even briefly sighting this so-called god mountain." A few years later, Clark disappeared while exploring a South American jungle. His measurement of Anye Machin did not fare any better: surveys by the Chinese in the 1970s determined the elevation of the mountain's highest point to be a humdrum 20,610 feet.

So now what about Wallerstein's estimation of K2's height—is it as suspect as all of the erroneous estimations of Anye Machin? If not, how could a mountain of such unremarkable proportions as Anye Machin be considered a contender for Mount Everest's title for the better part of five decades when, until this year, it had occurred to almost no one that K2—a mountain that stands some 8,000 feet higher than Anye Machin—might also be a contender?

The answer to the first question is maybe—but then again, maybe not. Regarding the second question, it should be explained that unlike Anye Machin, both Everest and K2 had been expertly surveyed and resurveyed so many times that their order of rank had come to be accepted by

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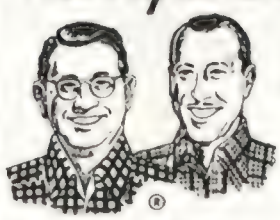

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virtually everyone as immutable. K2 was named and first triangulated by the British back in 1856. Its colorless moniker is a surveyor's preliminary designation that happened to stick, although the mountain is sometimes referred to as Godwin Austen.

Measuring mountains is a fiendishly difficult task, one in which there is ample room for mistakes to be made. As Louis Baume explains in *Sivalaya*, a compendium of facts about the world's 14 highest mountains, "... the calculation of the heights of Himalayan peaks is a realm of such erudite complexity that not even angels armed with theodolites and plumblines would dare to tread therein."

To calculate a mountain's elevation the traditional way, by triangulation, a surveyor first uses a theodolite to shoot the angle of the peak's rise from at least two different locations, each of which has a known altitude. After measuring the distance between the two theodolite stations, he knows the dimensions of two angles and one side of a huge imaginary triangle delineated by the mountain's summit and the stations. He plugs these numbers into a simple

Plume blows off K2 just above the snowfield reached by 1986 expedition.

trigonometric formula and then corrects the result to compensate for the Earth's curvature.

Ignoring, for the moment, the whole question of how the surveyor knows the height of his theodolite stations in the first place, let us consider some of the thornier problems he has to grapple with in the procedure outlined above. In crunching the numbers to arrive at the peak's height, for example, the surveyor must somehow take into consideration such wild cards as atmospheric refraction and plumb-line deflection. The latter, in the simplest terms, is the tendency for the immense mass of a range like the Himalaya to tug the leveling bubbles in a surveyor's instruments slightly toward the mountains—in the same way that the moon tugs on the seas—and thus throw them out of whack.

The former phenomenon, refraction, is the tendency for light rays—the same light rays responsible for the image of a mountain in the eyepiece of the theodolite—to bend as they pass through the atmosphere between mountain and surveyor, causing the mountain to appear higher than it really is. The precise amount of this warp is a crucial but slippery variable that hinges on such factors as the temperature and density of every atmospheric layer through which the light has passed.

Between sunrise and noon, for instance, as the atmosphere warms up and its refraction properties shift, the triangulated elevation of a distant peak can easily "shrink" several hundred feet. And the effect of this variable on a surveyor's figures swells exponentially with each additional mile between the surveyor and the mountain. In arriving at an elevation for Everest from stations on the far plains of India, surveyors have had to correct their height calculations by as much as 1,375 feet to compensate for estimated refraction.

All of the head scratching mentioned thus far, however, is just the

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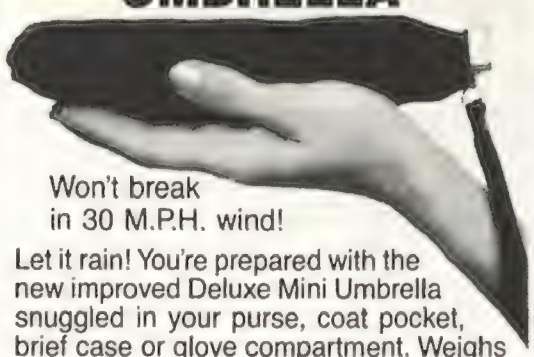

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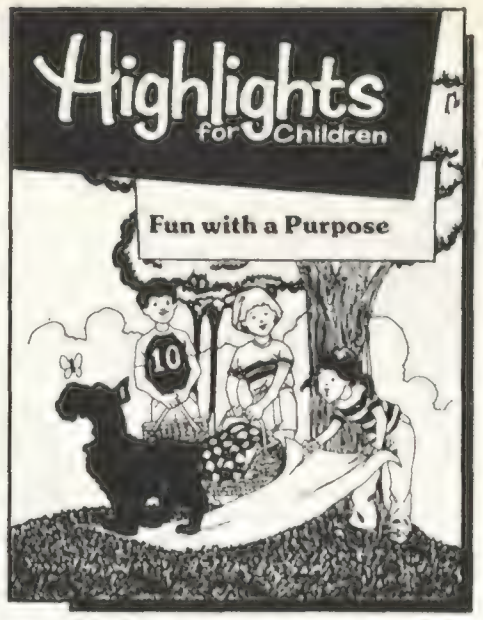

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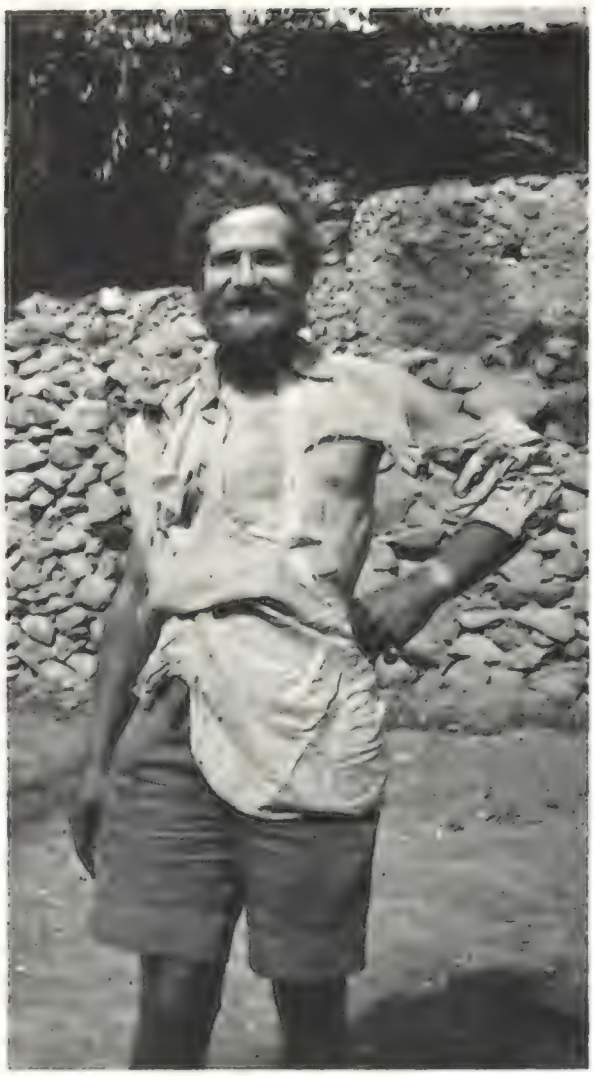

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final piece of the puzzle. If you haven't first correctly assembled the rest of the puzzle—which gives you the heights of your final theodolite stations—shooting your mountain will be a waste of time.

The stations from which Everest's height was triangulated by the British lay more than a thousand miles from the survey's initial starting point at the city of Madras, on the southeast coast of India; in the case of K2, the stations were more than 1,700 miles from Madras. Before either mountain could be measured, the altitudes of the final survey stations had to be established by a complex chain made up of thousands of independent triangulations carried link by laborious link across the whole of the Indian subcontinent (p. 178). That sort of work, says David Schramm, former head of the astronomy and astrophysics department at the University of Chicago, "is like

building a house of cards. Each level of data is built on the previous one. If one level is off, the deck collapses."

In his recent measurement of K2, George Wallerstein was able to completely sidestep the elaborate "house of cards" from which all earlier K2 surveyors made their calculations by relying on a 75-pound, suitcase-size instrument called a Doppler receiver. This particular Doppler receiver was designed to analyze radio waves beamed down by a network of six satellites originally put into orbit by the U.S. Navy as a navigational aid for submarines. By measuring subtle shifts in the pitch of these signals as a satellite passes overhead (the same oft-observed Doppler effect that causes the sound of a police-car siren to fall off sharply in pitch when it whizzes past), the instrument can determine the latitude, longitude and altitude of wherever it happens to have been plunked down.

Doppler receivers have only been around for a decade or so and they are expensive. But Lance Owens had a hunch that a satellite measurement might contradict the accepted eleva-

On K2 expedition last year, George Wallerstein resurveyed Spender's marks.

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Lance Owens (third from left) posed with other members of 1986 expedition.

tion of K2, so when he and Wallerstein found a used receiver available at a bargain price, they decided to take it on the expedition.

On June 8, 1986—a crisp, sparkling day in southwestern China—Wallerstein and other expedition members erected the antenna of the Doppler receiver on a small knoll near the base of K2. They turned it on and took an altitude fix from a satellite that was speeding by 700 miles overhead. Then, by means of that base elevation and an ordinary theodolite, Wallerstein triangulated the altitudes of several surrounding landmarks that he knew had last been surveyed in 1937 by an ace British surveyor named Michael Spender.

Upon returning to Seattle, Wallerstein discovered, much to his surprise, that the elevations Spender had recorded for those landmarks were all about 900 feet lower than his. Since Spender had used the summit of K2—which he assumed to be 28,250 feet high—as the sole benchmark from which every other elevation in his survey was derived, Wallerstein concluded that the long-accepted eleva-

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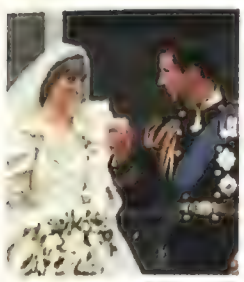

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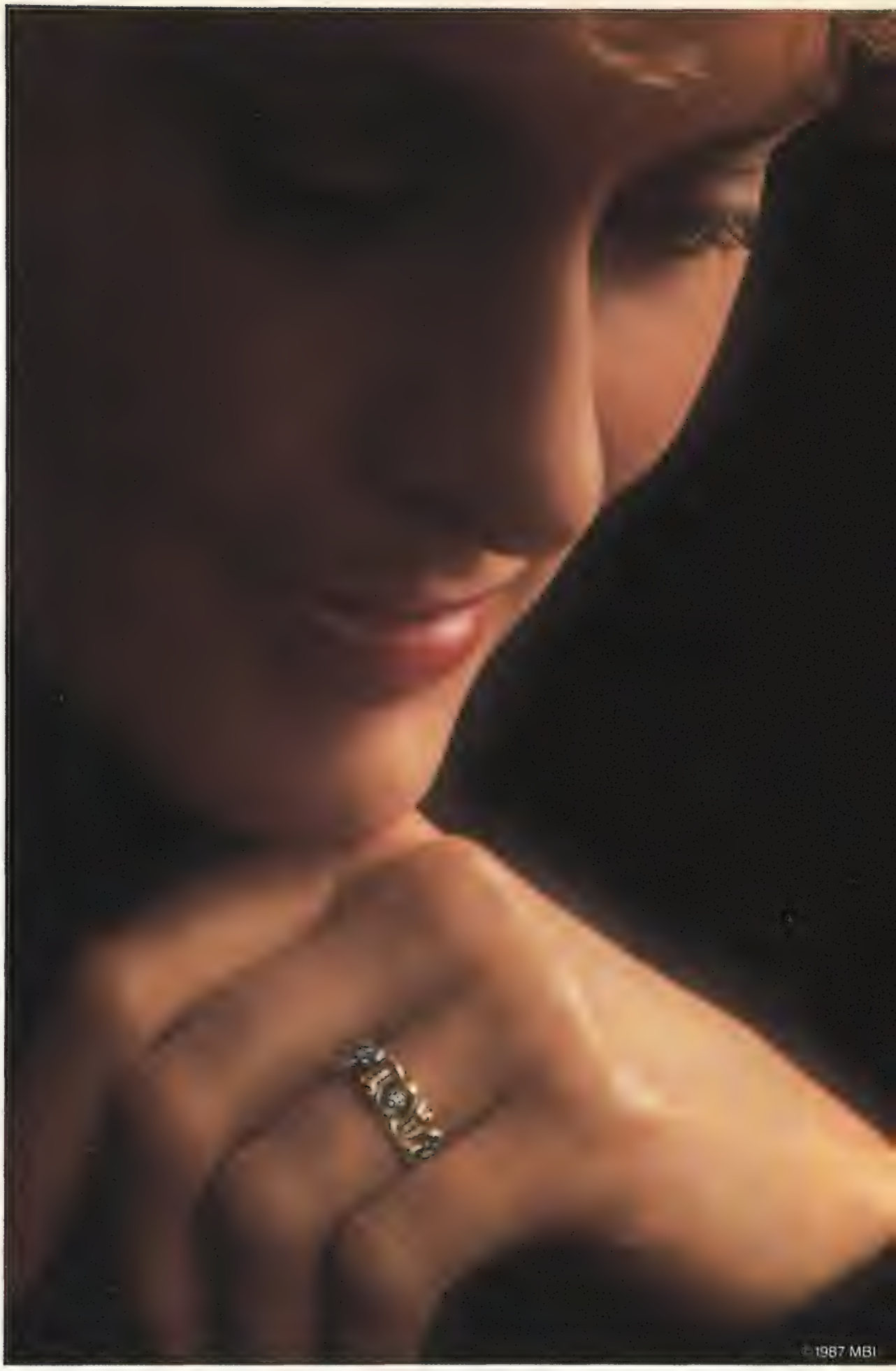

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tion of K2 must also be about 900 feet too low. By his calculations, K2 might actually be several hundred feet higher than Everest.

Since arriving at those numbers, Wallerstein—who is a distinguished astronomy professor at the University of Washington but has little experience as a surveyor—has taken great pains to emphasize that, because of the limited nature of the experiment, he isn't saying K2 *is* higher than Everest, only that it *might* be. The primary aim of last year's expedition was to climb K2 (the team got to 26,500 feet before being defeated by severe storms), not measure it. Wallerstein was obliged to spend the bulk of his time hauling loads of food and climbing gear. Consequently, he had only a few days in which to conduct his survey.

Furthermore, the solar battery-charger the expedition had counted on to keep the Doppler receiver powered up failed to work. As a result, the machine was able to record just one satellite pass before its batteries were drained. Although the 30-odd separate readings the receiver made from that solitary pass were very clear, without subsequent passes their accuracy could not be confirmed.

Several groups have already announced plans to resurvey both K2 and Everest. One of them, to be led by Lance Owens, will include a team of top geodesists and will adhere to widely accepted surveying standards. Scheduled for next spring, it will rely on a network of satellites even more sophisticated and accurate than those Wallerstein used. It should settle once and for all the question of which mountain is higher. Many mountaineers—excluding those who have stood atop Everest—are rooting hard for K2, feeling that it's more impressive-looking and much more difficult to climb. Nonetheless, most experts who have examined Wallerstein's findings—among them Bradford Washburn, who played a key role in bursting Anye Machin's bubble, and who will be an adviser to Owens' 1988 expedition—say the odds are good that Mount Everest will come out on top. And if not? "Well," Washburn allows, "I think Ed Hillary might be a little shook up."

Pakistani porters trudged toward K2 hauling supplies for the nine-man American team that attempted to reach summit in 1975 but was defeated by familiar foe: bad weather.

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In photograph snapped between hops, tour manager Don Keyhoe captured charm of "Slim."

In September 1927, fans packed a San Diego stadium to see the man who had soloed Atlantic.

By Michael Parfit

Retracing Lindy's victorious trip across the country

Sixty years after America's aviation hero brought the Spirit *to the people, the author repeats the 22,000-mile, 48-state flight*

Card section in bleachers spelled out flier's name; every visit was filled with similar hoopla.

In 1927 Charles Lindbergh did something amazing. He flew a single-engine aircraft called the *Spirit of St. Louis* to Abilene, Texas.

At least the people of West Texas thought it was pretty spectacular. On September 26, when he arrived, ten thousand of them lined the road from Kinsolving Field and cheered. A band played "Hail! Hail! The Gang's All Here." Eighty cars bearing pretty, young "Spirits" followed him into town, each car with a little wooden replica of his airplane bolted to its radiator cap. The city was breathless with excitement. Lindbergh spent 1 hour 36 minutes in town, the *Abilene Daily Reporter* said that evening—"long enough to win himself an imperishable place in the hearts of all."

But what was truly remarkable about his flight to Abilene was that it was part of a tour of the United States that Lindbergh took after the ink was barely dry on the headlines that announced his arrival in Paris. The Paris flight is etched in the memories of those who weren't even born then, but the U.S. trip has been generally forgotten. Yet the tour built a foundation for aviation where before there had been just a craze. Flying a plane with few of the instruments and none of the electronic aids that help today's airliners stick to

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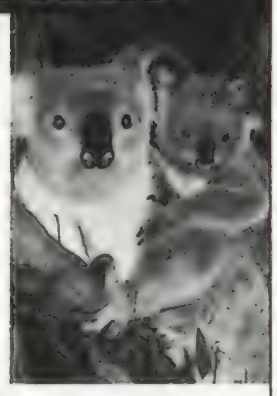

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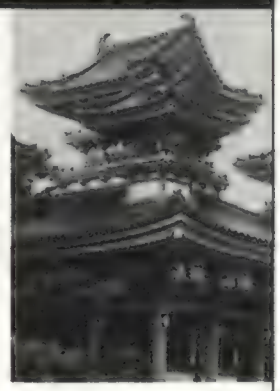

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Charles Lindbergh's three-month tour in *Spirit of St. Louis*, beginning in July 1927, included overnight stops in each of the 48 states.

schedules (more or less), Lindbergh flew to 82 cities in three months, overcoming hazards of fog, thunderstorms and endless questions about girls, and missed an appointment only once. The tour kept the excitement of the Paris journey in the public eye for the whole summer and fall of 1927, but most important, it showed that flight was not only dramatic; it could be reliable.

During the past few months I have been flying Lindbergh's 1927 route as part of a book I am working on about the United States. At first I had thought to use this almost-forgotten journey just as an itinerary, but as I zigzagged around this enormous country, it became clear to me how special the 1927 tour was. Lindbergh was a hero for flying to Paris, but when he flew around America he was a pioneer.

Few could tell whether he was going to be a pioneer or a problem, of course, when he came back from Paris on the cruiser *Memphis*. You couldn't tell from the press reports—as Brendan Gill wrote in 1977, "before the flight, they portrayed him as a lanky bumpkin out of the West; after the flight, they portrayed him as a Viking god." For all anybody at home knew, this dazzling new American hero might be venal and self-serving. James Thurber gave wonderful form to this fear years later in the short story "The Greatest Man in the World," in which an "erstwhile mechanic's helper in a small garage in Westfield, Iowa," named Jack (Pal) Smurch, "flew a secondhand, single-motored, Bresthaven Dragon-Fly III monoplane all the way around the world, without stopping . . . carrying with him only a gallon of bootleg gin and six pounds of salami." Smurch came back asking, "When do I start cuttin' in on de parties, huh? And what's they goin' to be *in* it?" and was so obnoxious that the secretary to the mayor of New York pushed him out of a window to a hero's death.

Lindbergh did not seem to be this kind of man, but there was no shortage of chances to cash in—offers for endorsements and promotional jobs had reached a total of $5 million by the time Lindbergh got home. The man who flew to Paris was monumen-

Michael Parfit retraced Lindbergh's route for a book he's writing about the people and landscape of America.

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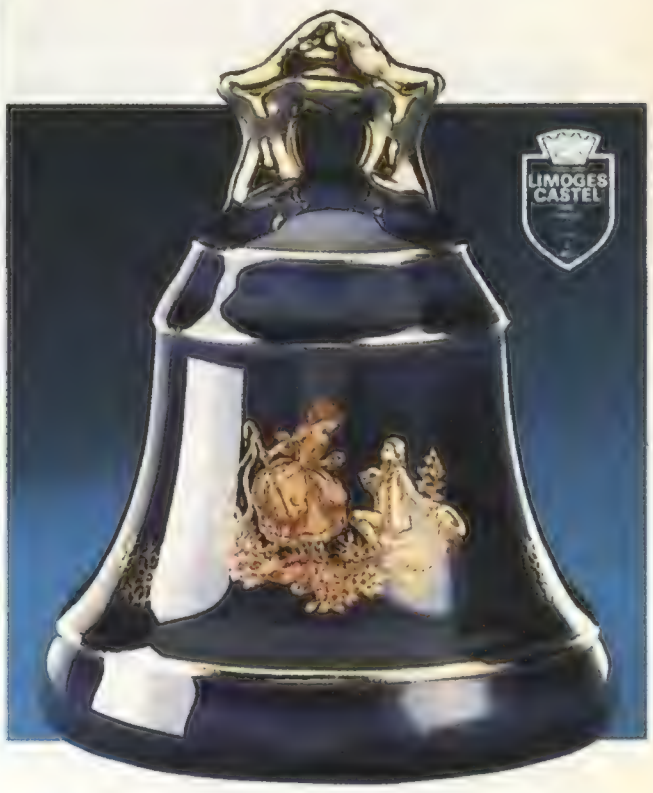

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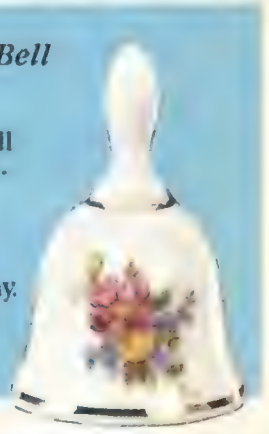

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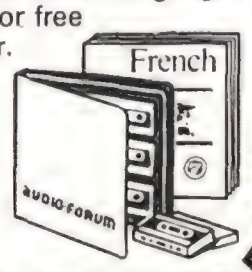

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As Lindbergh later pointed out in a letter to historian Bruce Larson, much of this concern about the promotional hash the new hero might get himself into was groundless: "I wasn't much worried about the 'wolves.'" But he, too, wanted passionately to promote aviation, so when the fund suggested a tour of the United States, Lindbergh agreed willingly. Spurning the $5 million, he took the job that would pay $50,000.

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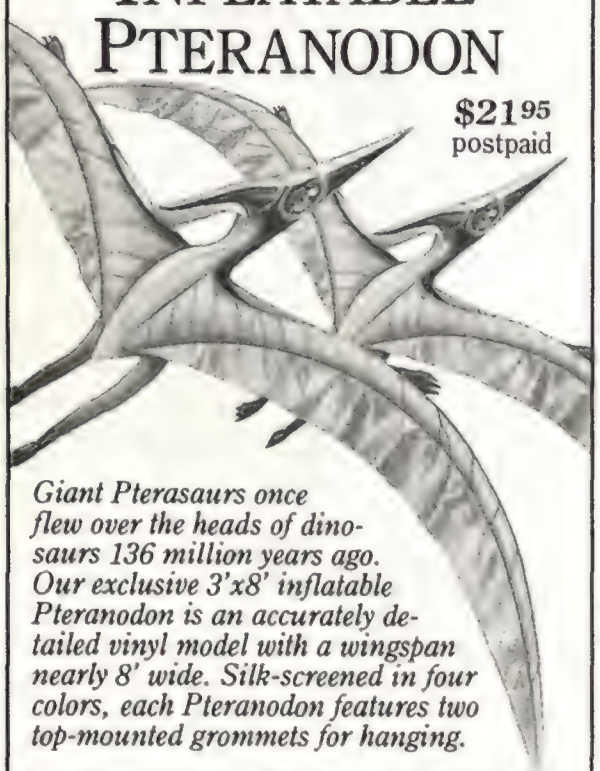

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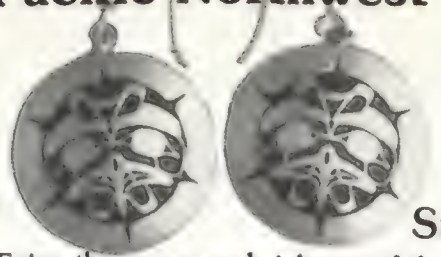
Don Keyhoe, now 90, reminisced about the tour with Lindy at his Virginia home.

Art of the Native Pacific Northwest



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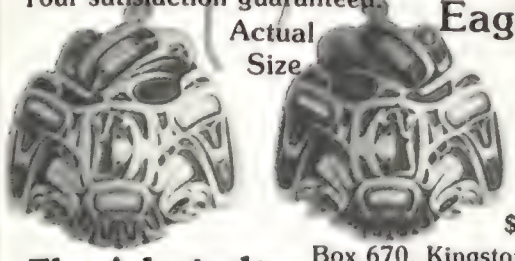

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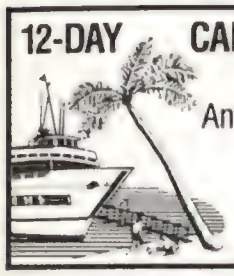

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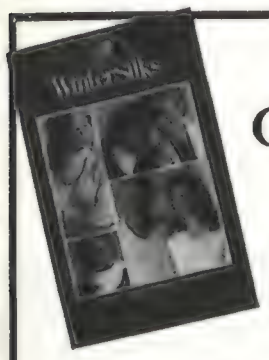

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"In the short distance between the office and plane he was to fly he was stopped a dozen times—by photographers, both professional and amateur, by a girl with an autograph book, by a boy wishing to fly with him, and a group who had no particular purpose except to get close enough to touch this famous youth who had flown across the ocean by himself." So Lindbergh had plenty of hints about what was to come.

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Hints, but not real understanding. How could anyone have really known what was coming? There was never a tour like this one. No politician had ever traveled to such resounding acclaim; surely no king or warrior or star of the screen had presided over such endless, spontaneous cheering; nor has anyone done so since. At some cities more people showed up at the airport and parade route than lived in the city. On the very first day of the tour, when the *Spirit of St. Louis* flew from Mitchel Field to Hartford, Connecticut, Keyhoe was so awed by the "vast crowd which lined the airport borders" that he kept glancing at Lindbergh to gauge his reaction, with little success. Lindbergh, he wrote, looked preoccupied.

No wonder: here he was setting out to talk to what he hoped would be sober groups of rational people about the birth of a new industry, and there were the faces of thousands of people drunk on the joy of just seeing him. In planning so many hours for serious speeches and discussions with

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In picture taken before Lindbergh's epic flight, his mischievous nature is obvious.

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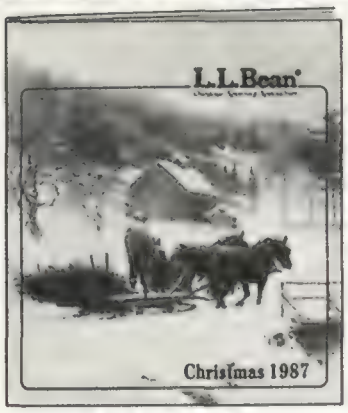

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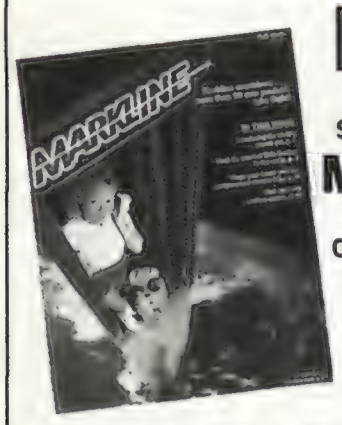
The *Spirit of St. Louis* heads west early in the tour; this photograph was taken by Don Keyhoe, who flew with two others in a second plane.



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aviation officials, Lindbergh must have hoped that the initial frenzy of Le Bourget and London and New York would calm down into the kind of careful interest with which he himself addressed most things. So, that first reception and the press conference that followed must have given him further reason for preoccupation. The press conference was marked by this exchange, as reported by Keyhoe:

"*Reporter*: 'Is it true, Colonel, that girls don't interest you at all?'

"*Lindbergh*: 'If you can show me what that has got to do with aviation, I'll be glad to answer you.'

"*Reporter*: 'Then aviation is your only interest?'

"*Lindbergh*: 'That is the purpose of this tour, to promote aviation.'

"*Reporter*: 'Are you always so evasive?'

"*Lindbergh*: 'I shall be glad to tell you anything I know—on aviation.' "

And thus the trip began on what must have seemed to him a disappointing note. Everyone was cheering his face, but no one listened to his words. Everywhere he talked about aviation, and everywhere people asked him about girls, about the color of his eyes, about girls, about the first words he had spoken in Paris, about his mother, about his hobbies, about girls. His laundry went out, but didn't come back. People wrote him letters, but they weren't filled with enthusiasm about airborne travel: they sent him perfume; they asked him personal questions; they even criticized his pronunciation of his favorite word. "I observed that you pronounced it 'a-vi-a-tion' with the 'a' as in 'hat,' " wrote one admirer, "whereas the correct form is 'a-vi-a-tion' with the 'a' as in 'late'. . . . I know that you will be glad to learn about these little errors in your speech." Instead of printing articles and editorials on the future of flight, newspapers published stories

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Minneapolis hotel (above) greeted Lindy and his plane (he called the duo "We"). Parfit saw only one rooftop sign (left), announcing Illinois population increase.

on what he allegedly ate. One paper reported that two hours before a banquet, Lindbergh's room had ordered, among other things, seven sandwiches, a potato salad, a double order of potatoes au gratin, two bottles of milk and an apple pie à la mode. The reporter hadn't realized that Keyhoe and the advance plane's pilot, Phil Love, also occupied that room.

People wanted personal contact with the hero. They touched him, pushed him and at least once tried to yank him right out of the parade car. During a banquet when a table leg under a cloth looked like Lindbergh's outstretched foot, a little procession of guests managed to stroll past during the meal just to tap what they thought was the famous shoe. In Spartanburg, the young women of Converse College gave up their dining room to a tour banquet on the condition that Lindbergh walk down "a lane formed by all the fair students." These worshipers didn't want to think about industry, transcontinental networks, schedules, and airports as big as railroad stations; they wanted to anoint a prince. In Abilene this was overt: when Lindbergh went to climb into the parade car he found it adorned with a magnificent chair, as Max Bentley of the *Daily Reporter* described it, "propped up in the tonneau and dolled up like a throne."

This was too much. Lindbergh shied, as if the throne were a snake. "He flushed painfully," Bentley wrote, "as he explained . . . his desire not to occupy the chair." So the chair was ejected and Lindbergh sat on the back of the car. But even this moment of tension, which Bentley called "The Throne Incident," became part of the legend. "No seat of honor for Lindy," a columnist wrote reverently the next day.

That was not quite true. His chosen seat of honor was in the sky, to him "the immortal viewpoint of the higher air." What need was there for acclaim on the ground when you could fly?

During this past spring and summer, as I flew west to east and back again, tracing the old route from Seattle to Salem to San Diego to Tallahassee to New York, dealing with fog and thunderstorms but never once having to answer a question about girls, I too sat for many days in that high seat of glory and solitude, and was glad to think of Lindbergh's escape. I thought about it when, like Lindbergh, I circled a glacial lake in the High Sierra and, as he wrote later, "saw its clear water like the air above, its gray rock bottom." I thought of it in the first few feet off the ground on takeoff from fields among level woodlands, when, like magic, the horizon raced out from a few hundred feet to miles. The crowds leaned around him whenever he was on the ground, blocking off the sky like cliffs full of eyes and breath, but in that first lift of flight he was free.

The cramped, noisy, half-blind cockpit a few hundred feet above the ground was his sanctuary. Lindbergh, Anne Morrow once wrote her sisters, "said that you *never got over* that feeling of serenity and sense of proportion" that flying gives you. Those were two commodities in short supply on the ground, so he created diversions in order to spend more time aloft. When the crew of the ad-

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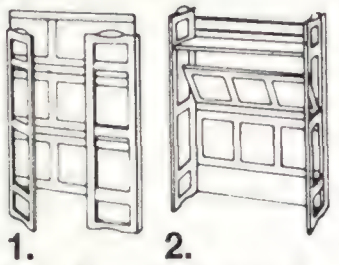

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vance plane was looking forward to a short hop from Fort Worth to Dallas, he rescheduled the flight to overfly several Texas cities to the south, and to spend extra hours in the air. In midsummer, in Montana, he extended what should have been a one-hour flight from Butte to Helena to almost seven hours by taking a tour of Glacier National Park, which is a couple of hundred miles out of the way. The unannounced diversion was accomplished by a start ahead of schedule; when the *Spirit of St. Louis* landed—right on time as usual—only those people who knew what time Lindbergh had left the airfield at Butte wondered why the plane had apparently flown only 12 miles an hour getting to Helena.

There is no track across the ground that you can see, like the Oregon Trail, that shows where Lindbergh flew in 1927. (Even though he sometimes tossed tomatoes or other bits of surplus gift food over the side.) Many smaller cities he flew over, dropping messages about aviation, agreed as a condition of the overflight to paint their names on convenient roofs

Unfazed by constant scrutiny, Lindbergh laughs with an old friend in St. Louis.

A parade through town, with Lindy waving from an open car (here in Hartford), was the order of the day, along with banquets, press interviews.

as signboards for visiting pilots. One mayor was so anxious to get Lindbergh to fly over that he had painters out on the buildings on less than an hour's notice, and when Lindbergh got there three signs were complete and one more was under way. I used to see those names when I was first flying around the United States in the early 1970s, but the roofs must have recently fallen to rust and progress. I have searched for them from Anderson, California, to Waxahachie, Texas, to Fargo, North Dakota, but the only rooftop lettering I noticed was a bright new sign on a barn near Moline, Illinois. It read: ITSABOY.

I spent a lot of time looking for reminders, but found them less on the ground than in the memories of people. In Atlanta, Georgia, I talked to Ben Epps, a kind and quiet man of 71, who remembered the day Lindbergh flew over the town of Athens, Georgia, where Epps was a

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child. School was let out and the children crowded into the yard to watch the brief passage of the little monoplane, he recalled; the description reminded me of my own generation's moment of no classes and excitement on the day John Glenn orbited the globe. Another child who watched the tour was Caspar Weinberger, now Secretary of Defense. Weinberger, who was 9 at the time, remembers standing in a window of a hotel room in San Francisco that his father had rented for the occasion, and watching Lindbergh pass in the parade below. Did he still look preoccupied? I asked. "No," Weinberger said. "He was smiling. He looked quite happy." Perhaps he had just accomplished one of the numerous practical jokes with which he peppered the lives of his tour companions.

Living with this man who seemed so earnest in public was unsettling. You had to pay attention. In flight he might hide the *Spirit of St. Louis* behind the advance plane, then emerge suddenly and rock his companions with wake turbulence. On the ground you might find a fish in your bed or have an impromptu cold shower. Lindbergh told Keyhoe he could "take any pictures you are able to

Editorial cartoon expressed Lindbergh's role in introducing public to aviation age.

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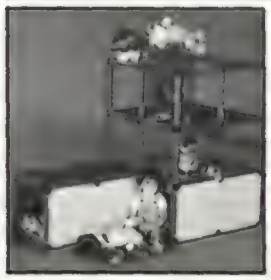

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Missoula youngster Billy Howard won local contest in 1927; along the route, Parfit found many people working in aviation whom Lindy had inspired.

get," which Keyhoe thought was most generous until he started looking for his lens, which Lindbergh had hidden. Later, after retrieving his equipment, Keyhoe looked down into the viewfinder and got a startling close-up of a live and aggressive Lake Erie crab. Once Lindbergh surreptitiously dumped the entire contents of a gift bottle of perfume on the coats of Keyhoe and Phil Love. Even days later, banquet table companions complained about the closeness of the room, Keyhoe wrote, and "in spite of the heroic efforts of hotel valets, Phil and I traveled for a time in a rose-scented world of our own." On another occasion, after Keyhoe attended an event that kept him out past an informal Lindbergh curfew, he got up in the morning and found his clothes all sewed shut. No personal adornment was safe. Lindbergh and other tour members, who went about bareheaded, took pleasure in regularly sitting on Keyhoe's hat, and late in the tour Lindbergh and three other members of the tour party cornered Keyhoe and shaved off his small mustache. These games seldom backfired, but once Keyhoe had the satisfaction of watching Lindbergh, thinking he had captured the latest Keyhoe headgear, sit squarely on the hat of a local dignitary.

As I flew the long route, Lindbergh —and Keyhoe, through the book that I used as a tour guide—became distant acquaintances, rather like the memories of relatives and friends who have died, with whom you still converse in your mind. They were somewhere out ahead of me on the

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route, making the decisions that ruled my life. I'd wake in my sleeping bag in the plane in the morning and consult with them, much the way they consulted with each other 60 years ago, about where we would be going in the next few days. I knew the outlines of the tour before I started, but when it came to flying it, the dimensions of the zigzags sometimes startled me. Bewildered, I would hold animated discussions with them. "We're going from Chicago to Milwaukee via where? Wichita?"

These two exuberant young men became such a living presence that words got all stuck inside me one day in Luray, Virginia, when a door on which I had knocked opened quietly and behind the haze of the screen stood an old man: Donald Keyhoe.

Keyhoe is 90 and frail. But he looked just like the man I knew from the photographs: a lean face, big ears. Even his voice sounded familiar, though I had never heard it before. In the dim light of his living room we talked briefly and quietly about the tour, and it was like talking to one's

Lindbergh rested at Elbow Lake in Montana, where he played pranks on pals.

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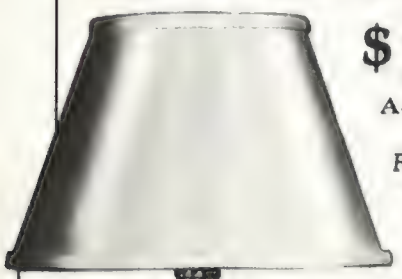

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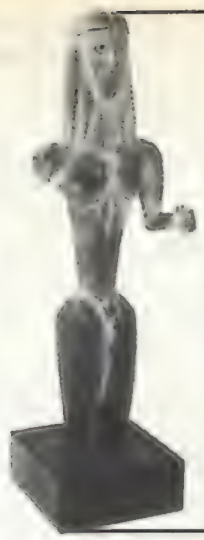

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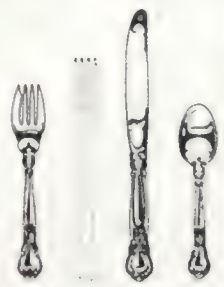

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own recollection of an event: his thoughts were incomplete and sometimes in fragments, but they were bright in detail.

"People were all the time wanting to pull him off somewhere and use him, you know," Keyhoe said. "There were always arguments, and sometimes there were real wise guys who thought they should be at the top. They'd come in, demand to be in on this and that. I said no. I said NO. And they'd get mad as the devil at me." He laughed.

I told him how amazed I was that they had kept so tightly to the schedule; my own flights had been diverted half a dozen times, and I had a full complement of instruments that didn't even exist in 1927. He smiled. "Sometimes the weather was not too good," he said. "We got to the point where we weren't scared, but we were serious."

He considered other hazards equally threatening. "There were so many times that girls were trying to hook on to Lindbergh and get some publicity. He was perfectly excellent: 'I'm sorry, we're booked ahead for three months and can't make any promises now.' Because I was his number one man to help him, sometimes they thought I could do something and slip it over on him. I said: 'Don't try that on me.'" Keyhoe laughed. "Lindbergh had a tremendous mind. He was terrific. Anyone who tried to pull a fast one on him, he lost out in a hurry."

Keyhoe grew tired easily. The interview was short. Near the end I asked him if it had been a relief for Lindbergh to get back in the airplane and fly. Keyhoe smiled. "Yes, it was," he said. "He lived on that."

Children who saw the tour remembered the hero; Keyhoe remembered the jokes and the pressures. Lindbergh remembered the land. "That tour let me know my country as no man had ever known it before," he wrote much later. "I saw New England's valleys dotted by white vil-

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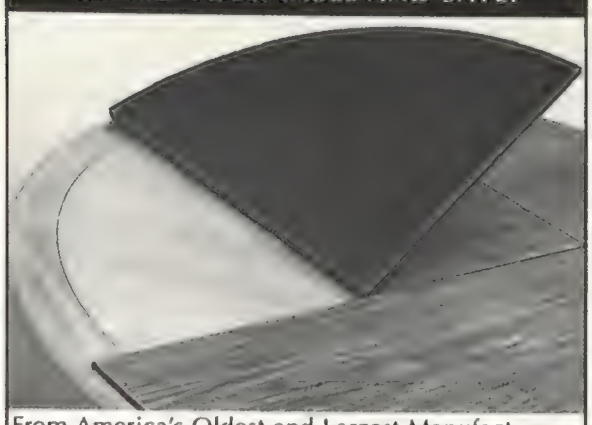

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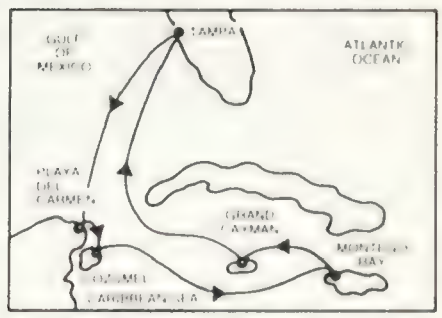

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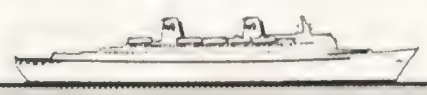

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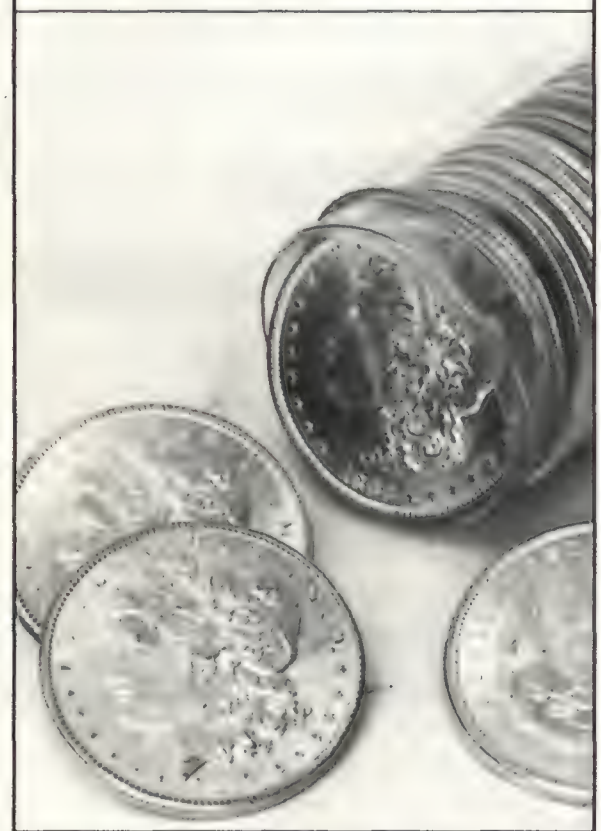

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lages, the crystal waters of Michigan's great lakes, Arizona's pastel deserts, Georgia's red cotton fields, the cascades and deep forests of the Oregon Northwest." It has been said that the tour, along with the parts of his childhood spent in Minnesota beside the Mississippi, contributed largely to his later work in conservation. So the most important celebration along the tour route during this 60th anniversary was a reunion in Lindbergh's hometown of recipients of grants given by the Charles A. Lindbergh Fund, which supports research by people who seek a balance between technology and the environment.

That makes a diverse group. In Little Falls that weekend I met people who were studying everything from the Meeteetse black-footed ferret to Antarctic ice movement to the maintenance of caring in a high-tech nursing environment. They talked about their work in seminars for three warm and hazy days against the background of one guiding Lindbergh sentence: "The Human Future depends on our ability to combine the knowledge of science with the wisdom of wildness."

In a way, the whole of Lindbergh's life was like the tour: he had things to say about aviation, science, technology and nature, but people always wanted to think about 33 hours of his 26th year. In trying to change that view in the world's eyes, the Lindbergh Fund spends more money on projects that embrace Lindbergh's ideals than it does on celebrations of the past. "Maybe it is time to stop remembering his life for what it meant to us," says Reeve Lindbergh, his youngest daughter, who is a writer, "and start remembering it for what it meant to him."

Years after the tour, when he wrote briefly about it in *Autobiography of Values,* Lindbergh still seemed frustrated that so few had understood what it meant to him: "I inspected sites for airports, talked to engineers and politicians, and tried to convince

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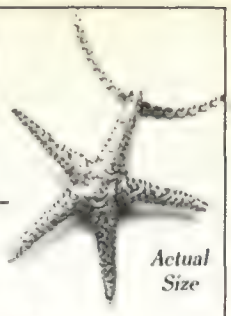

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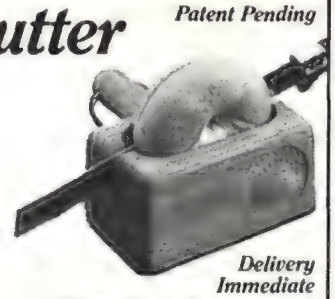

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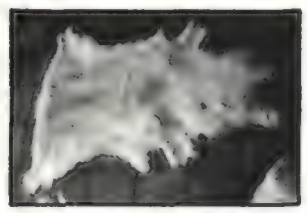

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By Joseph Sugarman

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everyone who would listen that aviation had a brilliant future. . . ." Yet the message came through. Most may not have listened, but they heard. The tour's effect was more profound than it seemed. The people who saw it thought it was a showcase for the man; but the effect was a powerful subconscious support for the message that too often was put into the back pages of the paper, behind observations of what he looked like and what he was wearing.

In spite of Uncle Sam's efforts to develop aviation by regulating pilots and promoting airmail delivery, most people still thought of flying as a daredevil's sport before Lindbergh's visit. If he had not made the tour, the crossing of the Atlantic might just have been the first fleeting sensation in the frenzy of long-distance flying stunts that soon became tarnished by too many deaths. But the very lack of aerial drama in Lindbergh's tour helped doom the circus of the air. Barnstormers would go into aerial surveying or Army uniforms. People would stop holding their breath at the sight of a biplane passing overhead. Most important, the aircraft was no longer a crazy way to move precious cargo.

The day that Guggenheim and Lindbergh were first planning the tour, a woman who watched him walking out to test that Army plane had fretted: "I don't think they ought to let him fly anymore. He means too much to the world now." But four months later, Lindbergh had flown 22,000 miles, had been seen by 30 million people and had changed the idea of flight. Now Mom and Dad could imagine someday flying to Chicago for Christmas. Now you could put your child or your love letters on an airplane and not despair. The people of America had trusted an airplane with their most beloved hero, and the airplane had carried him safely, and on time, into their embrace.

Aviator's youngest daughter, Reeve Lindbergh, shown here on her Vermont farm with son Benjamin, carries on her father's environmental efforts.

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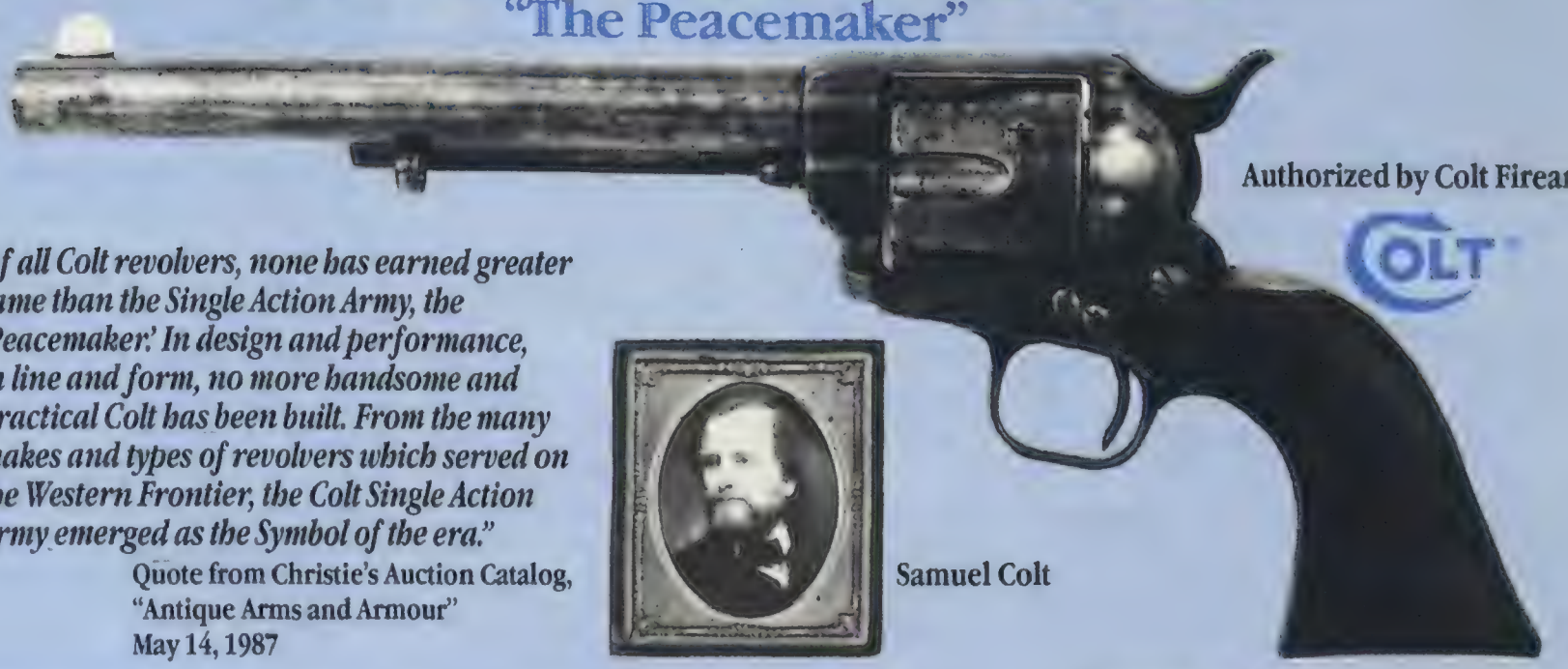

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Quote from Christie's Auction Catalog, "Antique Arms and Armour" May 14, 1987

Samuel Colt

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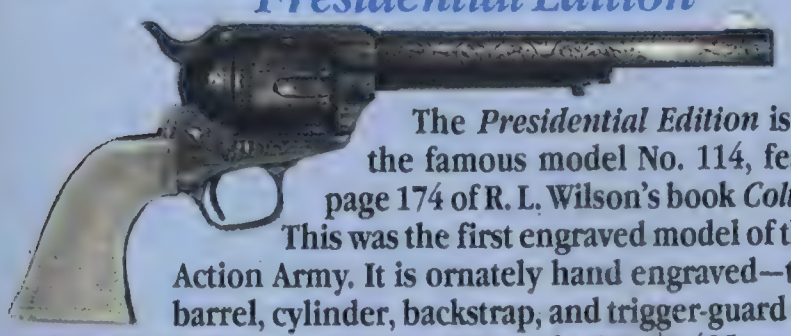

The *Presidential Edition* is based on the famous model No. 114, featured on page 174 of R. L. Wilson's book *Colt Heritage.* This was the first engraved model of the Single Action Army. It is ornately hand engraved—the frame, barrel, cylinder, backstrap, and trigger-guard strap. The grips are checkered ivory. An edition of 1,500. $1,425.

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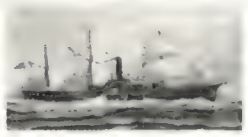

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Book reviews

Victoria: An Intimate Biography
Stanley Weintraub
Truman Talley Books/E.P. Dutton, $26.95

Throughout her long life, Victoria inspired colorful comments. Thomas Carlyle described her as "poor little Queen." Charles Greville, Clerk to the Privy Council, said she was "hard-hearted, selfish and self-willed." James Buchanan, then American Minister in London, called her "a fiery little devil." To Richard Wagner she was "a silly old frump." Her secretary, Gen. Charles Grey, in exasperation called her the "royal malingerer." Yet Queen Victoria, also known as grandmother of Europe, gave her name to an attitude and a life-style, and she exercised royal power in England as no one else had since Elizabeth I.

Victoria, in 1886, prepared for the Golden Jubilee and mourned Albert.

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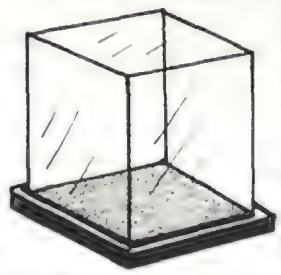

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Stanley Weintraub, a professor at Pennsylvania State University, believes that the Victorian Age requires a library rather than a book. He has done his best to fill the need, having written about several famous Victorians: Shaw, Whistler, the Rossettis. His recent addition, *Victoria*, the first full-length biography of Queen Victoria in a quarter of a century, sums up the entire period. This volume lives up to its subtitle, examining in detail personal and state problems of the durable little queen.

The approaching death of one of America's least favorite kings, George III, set off a scramble for power among his children—childless spendthrift dullards—that eventually left the field to Victoria. She, described by Weintraub as the "*pièce de résistance*," the daughter of the "false, hard and greedy" Duke of Kent and his "mediocre" German wife, became her mother's ticket to security and was, for all practical purposes, a prisoner in the residence allotted to the pair. Independence day came for the young heir presumptive when the Lord Chamberlain and the Archbishop of Canterbury brought her news of the death of her uncle, King William. Her first decision—to receive the messengers alone—was followed by an announcement that she would no longer share a bedroom with her mother.

Because most of her prime ministers (there were more than a dozen) were so important in her public life, each one is described as Victoria saw him and as he responded to her. Lord Melbourne, a father figure, groomed her for her role. Gladstone's Liberal Party policies annoyed her and his voyeuristic interest in prostitutes repelled her. She feared Disraeli's sharp wit but soon came to love the little man who told Matthew Arnold, "Everyone likes flattery; and when you come to Royalty you should lay it on with a trowel."

There is some previously unpublished, but not sensational, material. Weintraub discusses scandals, disappointing political marriages, the title—Edward the Caresser—applied in private to the Prince of Wales, and the extent to which Victoria's daughters disliked one another. Most unforgettable are Victoria's last days. The autocratic ruler—unable to use her legs, nearly blind and often mentally confused—was served by footmen who smelled of whiskey, and a staff that had become slipshod.

Weintraub's research reveals a few surprises. Victoria and her German-born consort were enthusiastic collectors of sculptures and paintings of nudes, in a time when John Ruskin called such art "degraded and bestial." Her attitude toward Albert was not "Victorian" as we use the word. She "doted on" his physical attractiveness, mourned his death for 40 years and responded "That is what I would call twaddle" to a pious preacher's trite words of consolation. As was common, Victoria turned her children over to nursemaids and governesses and sometimes did not see her younger children informally for as long as three months. A more maternal concern for her country was reflected in her worries about the Prince of Wales' "small empty brain" and his sons' inability to qualify for any "respectable school." From youth to old age, Victoria was attracted to male beauty and never failed to comment on any good-looking men she saw. She also enjoyed her status, signing her documents (after 1876) "Victoria R & I" (Regina and Imperatrix) with a flourish.

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On the political side, the biography traces a changing world. Victoria often complained, "It is a miserable thing to be a constitutional Queen and to be unable to do what is right." Democracy bewildered her. She opposed an inheritance tax and reserved all high-ranking military appointments for the upper class. She scoffed at education for the masses, believing it prepared them for opportunities that did not exist. Yet her ability to visit comfortably in a farmhouse kitchen, to cheer for P. T. Barnum and to cry about wartime casualties endeared her to her subjects.

Well researched and told with style, *Victoria* is timely because 1987 is the 150th anniversary of the queen's accession and the 100th anniversary of her famed Golden Jubilee.

Geraldine Foty
Massachusetts writer and critic

Travels in the Land of the Gods (1898-1907): The Japan Diaries of Richard Gordon Smith
Edited by Victoria Manthorpe
Prentice Hall, $25

The Roads to Sata
Alan Booth
Viking, $16.95

Travel books are like wine, a lot is done with the presses every year but very little vintage stuff comes out. The ideal travel book should be written by someone who knows enough to communicate information and is fascinated enough to convey excitement. All too often, though, the old hand has let familiarity dull the edge of wonder and the newcomer only knows enough to convey surface impressions. But every now and then, travel books appear that really do justice to their subjects. Such is the case here. Both these books are about traveling in Japan, both are written by Englishmen who lived there, and both show intimate knowledge of and fascination with this unique country.

Those are the similarities. The differences are that Richard Gordon Smith was an upper-class Edwardian and Alan Booth is a late 20th-century writer, and that they sojourned in Japan for very dissimilar reasons.

Gordon Smith was an independently wealthy naturalist, traveler and big-game hunter whose diaries include strikingly beautiful photographs, drawings and little souvenirs such as toothpicks advertising a brand of mineral water. His accounts cover the years (1898-1907) when

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he was fortunate enough to have the leisure and money to meander where he wished in Japan. Booth (a Tokyo-based writer and film critic) is a more focused traveler. *The Roads to Sata* is about a 2,000-mile, 128-day walk he took from Cape Soya, on Hokkaido, northernmost of the main Japanese islands, to Cape Sata, the southernmost tip of Kyushu, Japan's southernmost island.

One of the real values of Booth's book is that much of the territory he passed through (mostly along the western coast) is relatively unknown to foreigners. He didn't go to Tokyo, Kyoto or other more popular tourist and cultural spots. He stuck to the backroads and thus gives a very different picture of Japan than is usually presented. He didn't meet Madama Butterfly or the buttoned-down workaholics of popular legend; but he did meet (and drink and talk with) a wide variety of Japanese people. Booth has lived there for 17 years now, speaks the language fluently and has no illusions about life in Japan. After finishing the book, neither will the reader. For this reason alone, *The Roads to Sata* is a very good (if not required) textbook for anyone thinking seriously of taking up residence in Japan.

Directly and indirectly, Booth and Gordon Smith both show that no matter how long a foreigner lives in Japan, no matter how well he knows the language or understands the customs, he will always be an outsider, a stranger in a strange land. But they also tell us that if the outsider can accept this basic ground rule, he can have an interesting, exciting and generally pleasant time in the land of the gods.

While Gordon Smith writes like a gentleman traveler of his era (as occasional references to the "lower classes" show), Booth is far less formal. His walking tour through the byways took him to many places where a *gaijin* (literally "outside person") is still a novelty. Some of his dialogues with the Japanese have a Monty Python quality, as when Booth is talking to an old woman in Japanese and she is saying they cannot communicate because she can't speak English.

Booth spent a lot of time sitting around drinking and talking with the locals. Therefore, he doesn't just discuss the beauty and exquisite courtesy that abound in Japan. He also writes about the pornography (rampant, but often ludicrous), industrial blight and moments of appalling rudeness. But Booth heeds a bit of sharp advice that a white-haired villager gave him: "A country is like a sheet of paper; it's got two sides. On one side there's a lot of fancy lettering—that's the side that gets flaunted about in public. But there's always a reverse side to a piece of paper—a side that might have ugly doodlings on it, or bits of graffiti, or goodness knows what. If you're going to write about a country, make good and sure you write about both sides."

And Gordon Smith—who, though an avid hunter, was 180 degrees from the shooting-fishing caricature of the British sportsman—also addressed both sides. His diaries are salted with such insights as: "A stone of which you take no notice will catch the Japanese eye at once; it will be taken home and, with a little sand on a dish, it will be transformed into a rocky sea beach and, what is more, you will see it then yourself. But, hunt as you may along riverbeds for such a stone, *you* will never pick one up."

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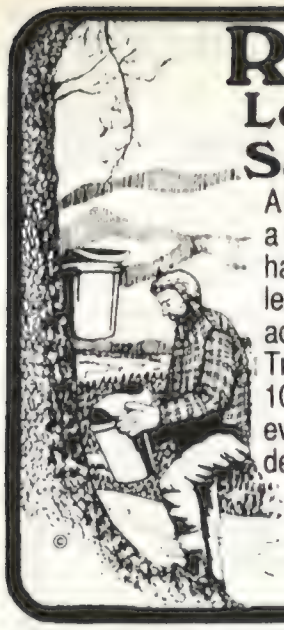

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the sensitive drawings and photographs on almost every page. Clippings and quotations make their way into the book as well. This diary ends with one, a Japanese poem "that interested me":

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> Methinks that now
> It cannot measure more than
> four foot six
> For I, a humble man, scarce
> five-feet tall,
> Find it impossible to fit myself
> Into its small dimensions.

The illustrations, the binding and the handsome endpapers make it one of the most beautiful books to come along in years. They show a Japan that is gone, but not bygone. The essential Japaneseness in the Gordon Smith diaries still survives. It surfaces in Booth's book as he tries to explain to an old man why he is making his trip. The old man, though, has the last word. "You can't understand Japan."

One small point: although there are small maps of Japan in both books, you will get far more out of them if you have a large-scale map of Japan (the bigger the better) on hand when you read.

While somebody who has never been to Japan will learn a lot, probably both books will appeal more to people who have spent time there. Any memory or association with Japan that can be dredged up will be evoked by these oddly companionable volumes. *Travels* and *Roads* are like unmatched salt and pepper shakers—one, elegant Edwardian silver; the other, a smoother modern alloy. Superficial differences aside, the contents complement each other perfectly.

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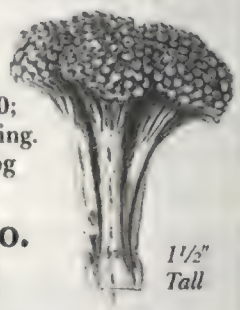

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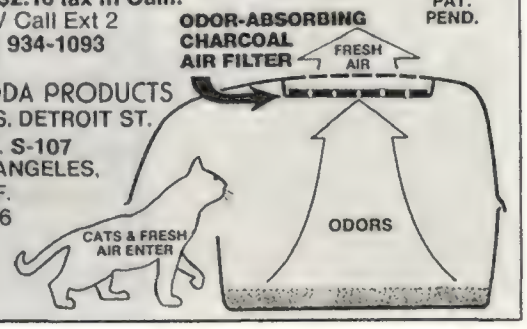

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The Superstitious Mind
Judith Devlin
Yale University Press, $30

Besides the rallying cry of Liberty, Equality, Fraternity, the banners of the French Revolution could have mentioned Rationality. Beginning with Voltaire, to banish all that could not stand up to the scrutiny of reason was an objective of the Enlightenment.

Thus it comes as something of a surprise to admirers of one of France's civilizing missions that in the 19th century, and even to some extent today, that homeland of rational analysis wallowed in the dankest superstitions of the Middle Ages—if not the Dark Ages—fervently believing in fearful supernatural beings and magical practices. That is the thesis of Judith Devlin, who broadens her case by adding that over the ages and up to our day, "man's vocabulary rather than his nature has changed."

With the zeal of a state's attorney prosecuting racketeers, Devlin goes after the superstitions of French peasantry in the 19th century. She marshals a wealth of evidence to prove beyond a shadow of a doubt that in north and south, in the mountains and on the plains, in fact throughout all the 95 *départements* of France, rural folk believed in the reality of such creatures as werewolves and elves, dragons and ghosts.

Sorcerers—good and evil—abounded; magic spells were routinely cast and their effectiveness was widely accepted. The hierarchy of the mighty Catholic Church and the network of scientific medicine both were forced to take a back seat to preindustrial, and frequently preliterate, witchcraft.

In the tradition of *The Golden Bough*, Devlin's grasp is encyclopedic, as her chapters delve into phenomena such as possession and prophecy, apparitions and omens. Her investigation extends to such obscure categories of people as the *voyageuses*—old ladies who visited shrines on behalf of the ill. Devlin records that one such lady who died in 1926 left 20 kilos of copper coins given her by those for whom she went to the shrines. A small but telling fact cited by Devlin is that in 1963, France had more than 40,000 faith healers but only about 38,000 medical doctors.

She seems to agree with the rationalists of the 18th century who attacked superstition as a form of emotional tyranny and as a means of political oppression. In their view, obscurantism was to disappear with oppression; tolerance, peace and prosperity were to banish fear, fanaticism and superstition.

Devlin sees a direct link between premodern superstitions and contemporary political extremism. Behind 20th-century conspiracy theories and anti-Semitism, mass rallies and show trials, she perceives the deep influence of the irrational with "its taste for reallocating responsibility for difficulty and disaster, its old hostility to wealth and power, its tendency towards self-deception and self-justification, its delight in collective celebration and evasion through myth."

Devlin's research is impressive and without doubt she knows France. The case she presents is strong. However, reading her voluminous documentation, one wishes for another opinion, even a change of venue. The sticking point has to do not with the weight of the evidence, but with its manner of presentation. Judging what Devlin uncovered, Thomas Mann would have been intrigued and Isaac Bashevis Singer delighted. Carl Gustav Jung and Mircea Eliade would

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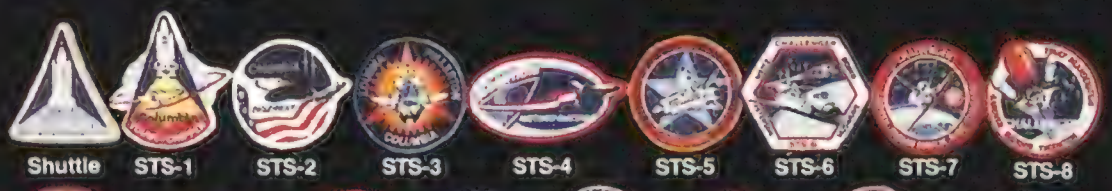
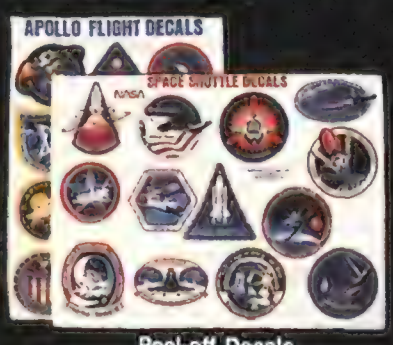


"God Bless Our Fallen Heroes"



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have smiled their wisest smiles. All four of them would have smacked their lips listening to Devlin telling such tales as that of an illiterate woodcutter who became a sorcerer after a stranger—an old man to whom the woodcutter offered hospitality one stormy night—left with him a book of spells. Devlin primly, if not prissily, observes: "Today the authority of such a tale would be undermined by its implausibility, but historical accuracy was irrelevant to this kind of story ... its purpose was to identify the healer as a virtuous man and competent doctor by placing him in a well-established tradition, and to arrogate to him the authority and prestige of his celebrated forerunners."

Devlin is too contemptuous of all that strikes her as irrational; she seems to yearn for our liberation from feelings and practices she regards as mistaken and misguided. Her analysis is fragrant with the rectitude of rationality.

Charles Fenyvesi
Associate editor, *U.S. News & World Report*

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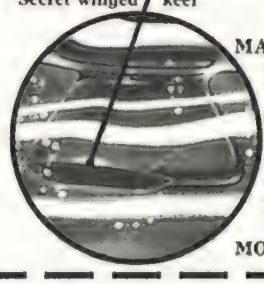

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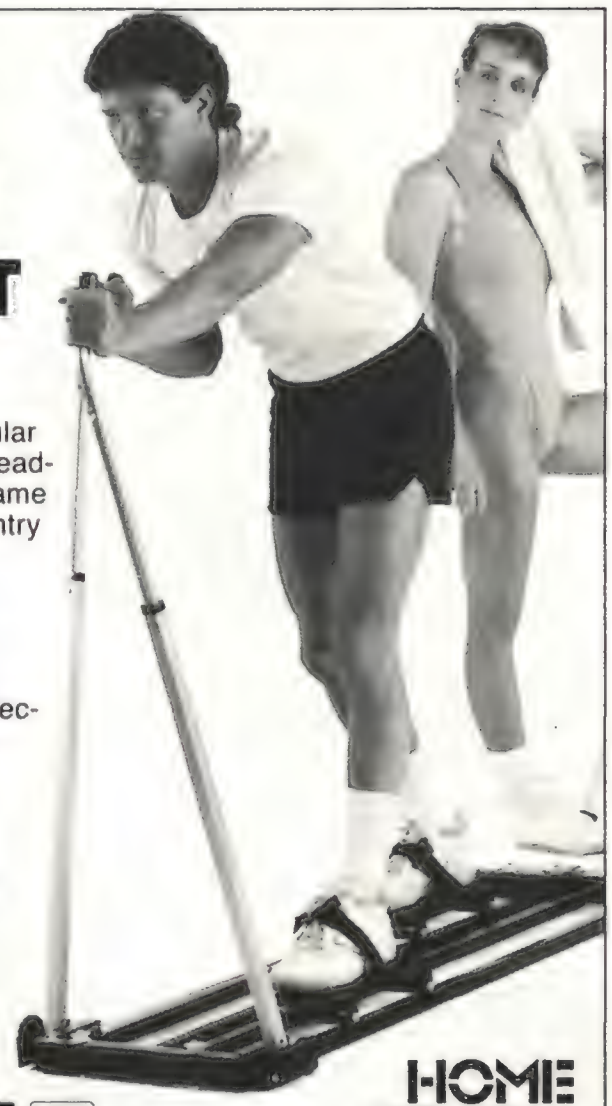

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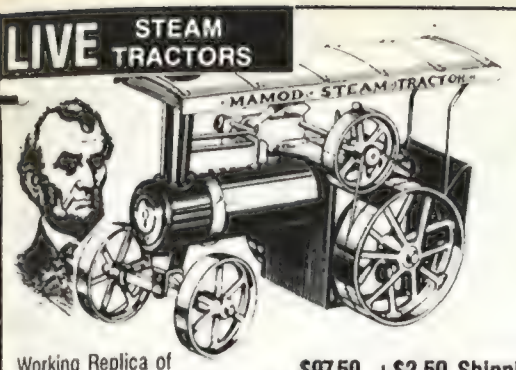

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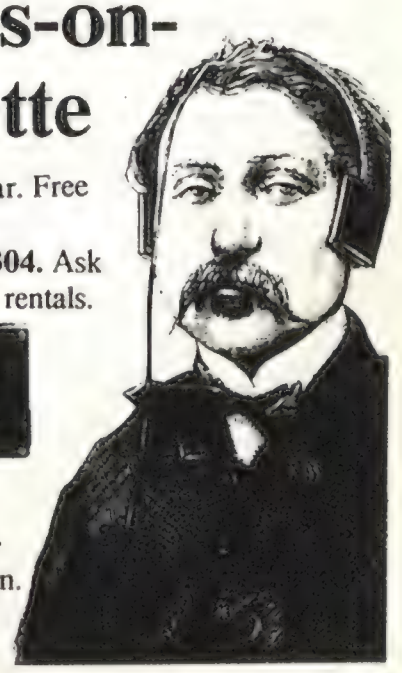

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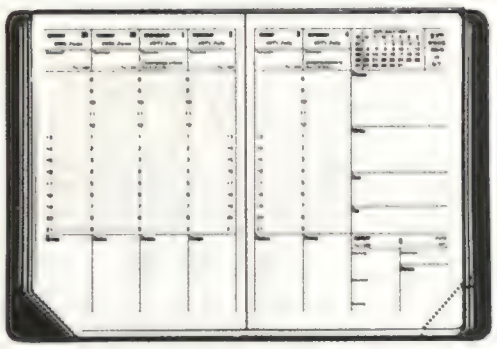

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Smithsonian highlights

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The museums have resumed regular hours, 10 A.M. to 5:30 P.M.

Special October exhibits and events

Renwick Gallery
Lost and Found Traditions: Native American Art 1965-1985 (October 2-March 6) See *Highlights continued.*
Dan Dailey: Glass, 1972-1987 (through October 25) Vases, sculptures, drawings.

National Museum of American Art
American Traditions in Watercolor: The Worcester Art Museum Collection (through November 22) Masters of the medium from Homer to Wyeth.
John La Farge (through October 12) Paintings, graphics and stained glass by the versatile 19th-century master.

Arthur M. Sackler Gallery
In Praise of Ancestors Extensive collection highlighting bronzes, jades.
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Pavilions and Immortal Mountains: Chinese Decorative Art and Painting (through February 1988) Furniture, paintings and precious objects reflecting the tastes of an elite segment of Chinese society.
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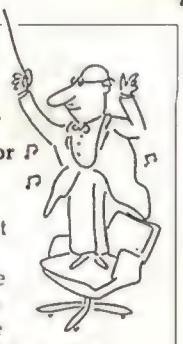

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National Museum of African Art
African Art in the Cycle of Life (through March 20) Works of sub-Saharan art from public and private collections.
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Objects of Use (through May 2) Exquisitely crafted utilitarian objects.
Patterns of Life: West African Strip-Weaving Traditions (through February 29) A rich selection of textiles.
Royal Benin Art in the Collection of the National Museum of African Art Traditional court art produced during 500 years.

Anacostia Museum
Climbing Jacob's Ladder: The Rise of Black Churches in Eastern American Cities, 1740-1877 (October 18-March 20) One hundred fifty illustrations and artifacts.

National Museum of American History
A More Perfect Union: Japanese Americans and the United States Constitution (October 1-indefinite) An examination of the relocation experience.
We the People: Winning the Vote, Getting the Vote (through 1988) The development of the American political process.
Official Images: New Deal Photography (through January 1988) A chronicle of FDR's America.

Hirshhorn Museum & Sculpture Garden
Lucian Freud (through November 29) Eighty paintings in a major retrospective by the British realist.
Roger Brown (through October 18) Evocative canvases by the Chicago Imagist.

National Portrait Gallery
American Colonial Portraits: 1700-1776 (October 9-January 10) First exhibition on the subject since the 1930s.
Recent Acquisitions (through February 14) Exhibitions of paintings, sculptures, prints and photographs.

Cooper-Hewitt Museum (New York)
Honor and Glory: Monumental Arches (October 13-January 31) More than 60 drawings, prints, rare books, models.
Pop-Up and Movable Books (October 27-February 21) Subjects from medicine to fairy tales.

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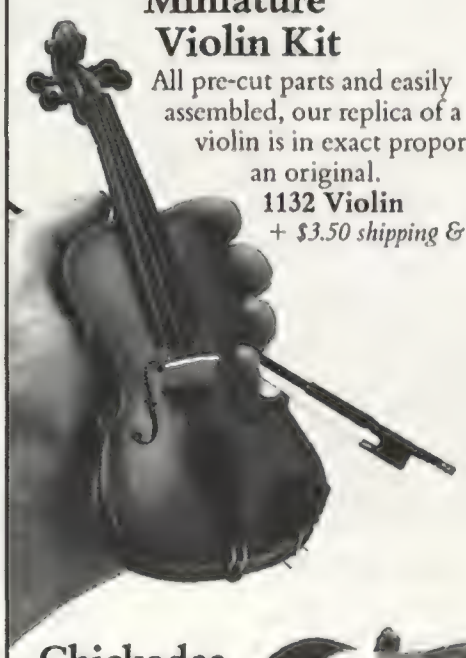

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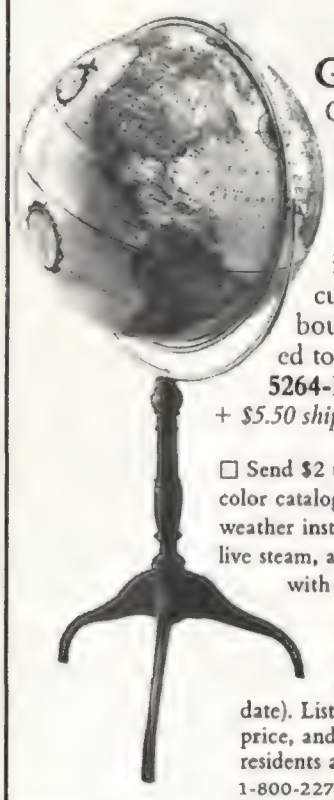

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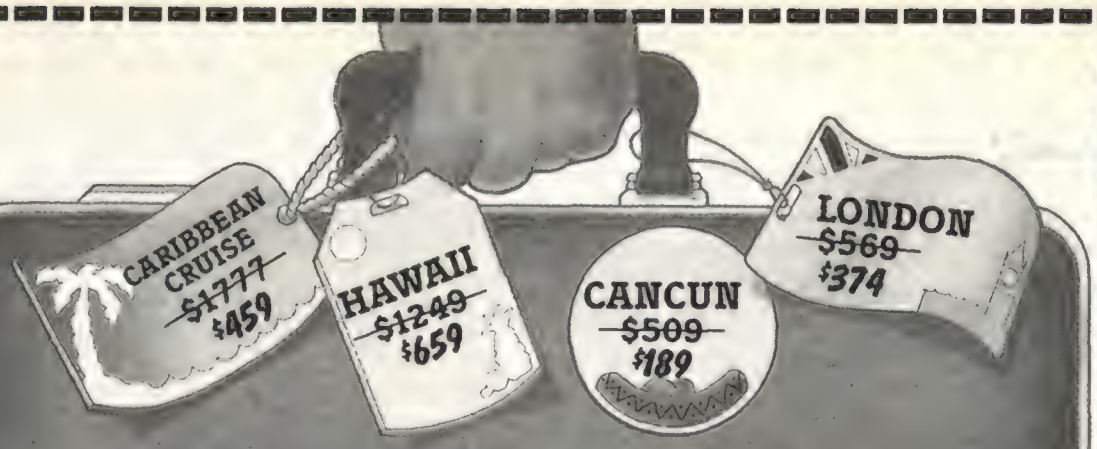

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National Museum of Natural History
On China: Photographs by Hiroji Kubota (through November 13) One hundred color images by the eminent Japanese photographer.
Ebla to Damascus (through January 1988) First major display of archaeological material from Syria.

National Air and Space Museum
U.S. Customs Service (October 15-indefinite) How the Service uses aircraft to detect and intercept drug traffic.
Into the Sunlit Splendor (through December 31) Forty paintings by aviation artist William S. Phillips.
America's Space Truck The U.S. space shuttle in photographs, video displays.

Exhibition catalogs

Catalogs available at this time include:
African Art and the Cycle of Life (paper, $19.95; cloth, $39.95)
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Lost and Found Traditions: Native American Art 1965-1985 (paper, $25.95)
Official Images: New Deal Photography (paper, $24.95)
Lucian Freud: Paintings (paper, $21.95; cloth, $40)
Into the Sunlit Splendor: The Aviation Art of William S. Phillips (paper, $5)

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Radio Smithsonian: Features on this weekly half-hour series include a look at the Woodrow Wilson International Center for Scholars, the work of Chicago artist Roger Brown and the Smithsonian's new museum complex.
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To find out what stations in your area carry these programs, write Office of Telecommunications, MAH Room BB40, Washington, D.C. 20560.

Lecture and Seminar Program

The states of Montana and Washington will host the Program in October. Smithsonian curators will visit Helena, Montana (October 8-10); Billings (October

8-11) and Missoula and Bozeman (October 14-18), with presentations on aviation, fossils, historic preservation, gems and more. A series in Seattle, Washington (October 13-19), will include seminars on nature photography, biography and volcanology. In Tacoma (October 13-17), lectures will be presented on contemporary art, anthropology and plate tectonics. For further information, write to the Lecture and Seminar Program, 1100 Jefferson Drive S.W., Washington, D.C. 20560 or call (202) 357-1350.

Resident Associate Program

To become a Resident Associate, or for fee and ticket information, call 357-3030. Here are some October events:
George Russell and the Living Time Orchestra (October 2; 7:30 P.M.) Legendary composer, orchestra in Washington debut.
Peoples and Politics in the Soviet Union (six Wednesday evenings beginning October 7; 8 P.M.) Lectures by scholars, journalists on a superpower in transition.
What Makes a City Livable? The Washington Experience (October 5; 6:30 P.M.) Distinguished speakers on urban revitalization.
Music and Dance from Mongolia (October 10; 4 P.M.) Nine traditional performers.
Thomas Jefferson in Ronald Reagan's America (October 26; 6:30 P.M.) Dr. Ralph Ketcham of Syracuse University on the statesman.

Smithsonian Institution Traveling Exhibition Service

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Albuquerque (October 3-November 29) *Power and Gold: Jewelry from Indonesia, Malaysia and the Philippines*, Albuquerque Museum.
Colorado Springs (October 3-November 13) *New Vistas: American Art Pottery 1880-1930, from the Cooper-Hewitt Museum*, Pioneers Museum.
Rockford, Illinois (October 9-November 9) *Fields of Grass*, Augustana College Art Department.
Salisbury, Maryland (October 24-November 22) *Recent American Works on Paper*, Salisbury State College Gallery.
Springfield, Massachusetts (October 10-November 8) *Drawn from the Sea: Art in the Service of Ichthyology*, Springfield Science Museum.

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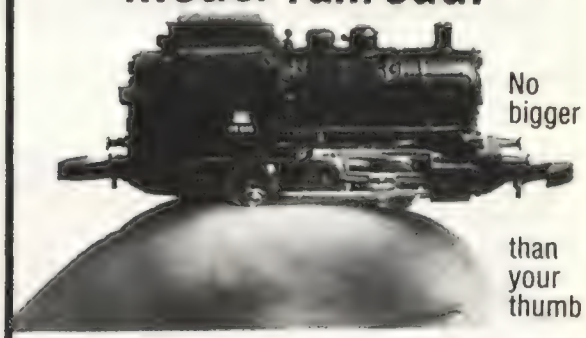

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At the Renwick, American traditions

"This exhibition," says curator Ralph T. Coe, "records journeys into the American Indian world that I made during most of a decade." From 1977 to 1985, he traveled across America and into Canada, searching out the work of native American artisans—going, as he puts it, "off the map."

The result of his odyssey, "Lost and Found Traditions: Native American Art 1965-1985," opens at the Renwick Gallery on October 2. It is testament to an enduring artistic legacy.

Coe's journey on unmarked byways and back roads took him to more than 70 tribes, from the Passamaquoddy of Pleasant Point, Maine, to the New River settlements of the Niska in British Columbia. Along the way, craftsmen displayed and shared their treasures, from textile weavings to silver brooches, headdresses to canoes, beaded buckles to snowshoes—there's even a 35-foot-high totem pole.

Each object, whether made for everyday use or crafted for ceremonial events, reflects the vitality of a tradition given new expression. The old ways, it seems, have not only survived but prevailed in the hands of succeeding generations.

The show, organized by the American Federation of Arts, continues on to Albuquerque; Los Angeles; Rochester, New York; and Columbus, Georgia.
Kathleen M. Burke

Textile of hand-spun wool depicts rituals of a Navajo healing ceremony.

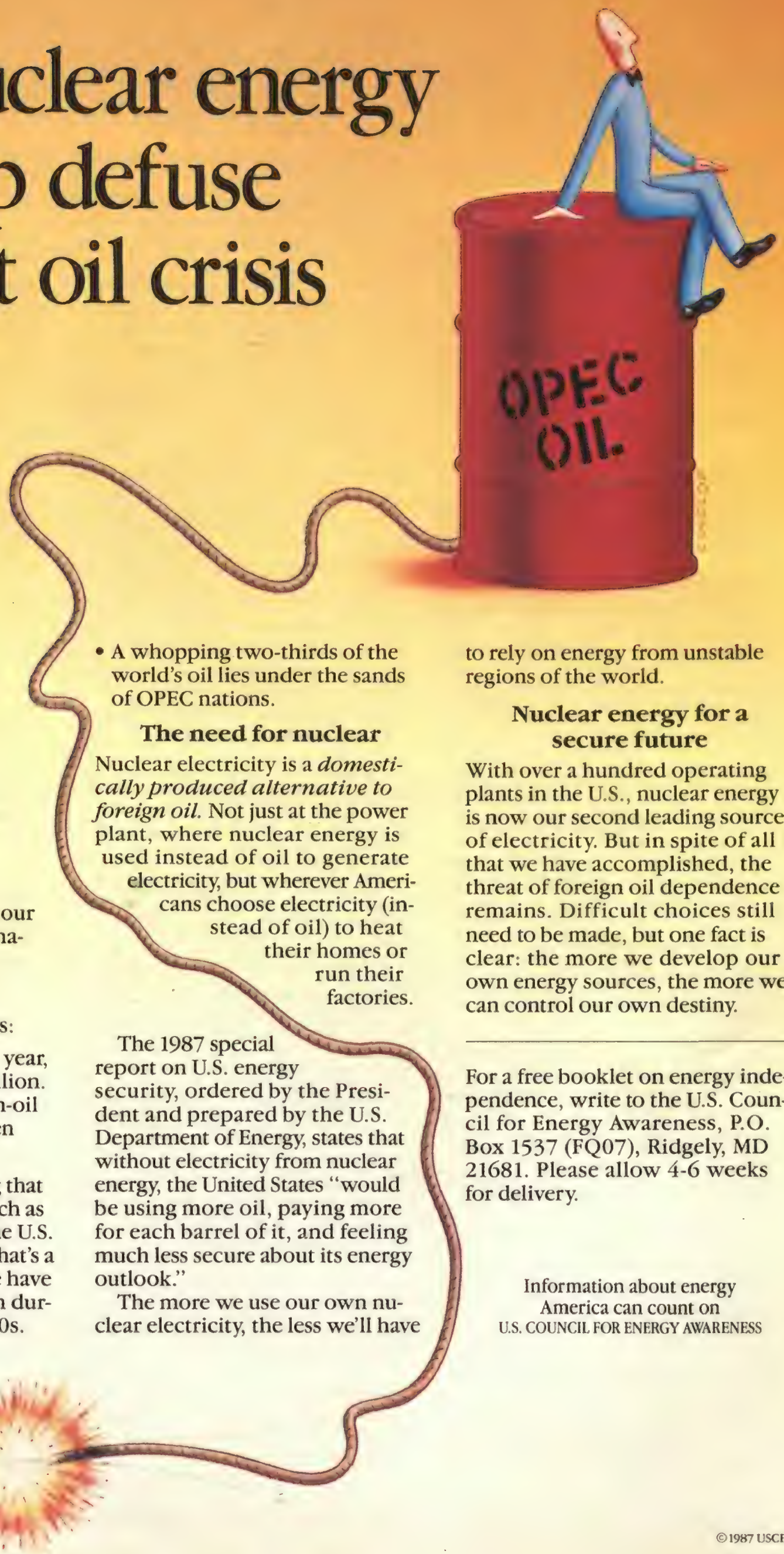
Hopi tablita is a dance headdress made for girls by their boyfriends or uncles.

Painted red-cedar dogfish mask was carved by Jim Hart of British Columbia's Haida, worn by him in tribal dance.

Artist Johnny Hoof's Arapahoe tooled-leather box, a rarity for its elaborate painting, held religious paraphernalia.

Beaded sneakers by Effie Tybrec, a Sioux in South Dakota, invest familiar footwear with her own exquisite artistry.

How nuclear energy can help defuse the next oil crisis



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More and more energy experts are asking the same question: How long before another oil shock torpedoes our economy and threatens our national security?

Oil turmoil

Signs of the next energy crisis:

- U.S. oil imports soared last year, costing the country $27 billion. This year, America's foreign-oil bill is expected to grow even bigger.
- Many oil analysts are saying that in three years or less, as much as 50% of all the oil used in the U.S. will have to be imported. That's a higher percentage than we have ever imported before, even during the oil crises of the 1970s.
- A whopping two-thirds of the world's oil lies under the sands of OPEC nations.

The need for nuclear

Nuclear electricity is a *domestically produced alternative to foreign oil.* Not just at the power plant, where nuclear energy is used instead of oil to generate electricity, but wherever Americans choose electricity (instead of oil) to heat their homes or run their factories.

The 1987 special report on U.S. energy security, ordered by the President and prepared by the U.S. Department of Energy, states that without electricity from nuclear energy, the United States "would be using more oil, paying more for each barrel of it, and feeling much less secure about its energy outlook."

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Domestic Study Tours

Florida Keys October 24-30: Return to camp as an adult at Seacamp on Big Pine Key; discover mangroves, tide pools and colorful coral reefs with marine experts.

Christmas at the Smithsonian December 4-6: Welcome the holidays with tours, music and festive dining. Visit the new Museum of African Art, Haupt Garden and Sackler Gallery.

Everglades December 5-12: For the novice or expert, canoe and camp among Florida's Ten Thousand Islands.

Christmas in Santa Fe December 20-27: Experience the festive traditions of the Spanish and Indian cultures of the Southwest.

Florida Springs February 6-10: Canoe the freshwater springs of central Florida and see the endangered West Indian manatee.

Hawaii February 6-18 or February 20-March 3: Experience undersea wonders, great volcanoes, lush forests and whale watching.

Baja Whale Watch February 22-March 1 or March 1-9: Discover the beauty of Baja California in company of gentle gray whales.

Death Valley March 12-20 or April 10-18: From your base at Stovepipe Wells Motel, explore this fascinating area. Visit Scotty's Castle, photograph desert flowers and hike to scenic overlooks including Dante's View and Zabriskie Point.

Sojourn in Tucson April 10-17 or 17-24: Settle in for a week-long overview of Tucson's social and natural history.

Southwest Indians April 29-May 8: In this in-depth look at Southwest Indian cultures, travel to Phoenix, Chaco Canyon and Canyon de Chelly. Meet craftsmen, visit museums and private collections.

San Francisco May 14-21: Experience the ambience and charm of this popular destination while visiting sites beyond the usual tourist route. An overview of the city's history, ethnic diversity and future prospects.

Atlantic Quest May 18-June 1: Retrace America's history from Florida to Maine aboard the *Illiria*. This unique voyage begins in New Orleans and includes stops at St. Augustine, Savannah, Charleston, Providence and many other historic ports; tour concludes at Campobello Island in New Brunswick.

Sanibel Island May 22-28: Tidal walks and canoe journeys take you in search of alligators, roseate spoonbills and loggerhead turtles in this delicate estuarine environment on Florida's Gulf Coast.

Washington "Anytime" Weekend Discover your capital city in Smithsonian style with this economical package. Visit the new Quadrangle building complex which contains the recently opened Museum of African Art and Sackler Gallery. Reserve with VISA or MasterCard now.

Foreign Study Tours

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Christmas in Europe Celebrate with fellow Associates in one of four idyllic settings: Munich and Rothenburg; Salzburg and Vienna; Canterbury; or Winchester.

Christmas in Fiji December 17-29: Enjoy the holidays in a South Sea island setting. Reside at the intimate Namale Plantation overlooking the Pacific.

Backstage London January 1-10: In Europe's theater capital, attend traditional and avant-garde productions, meet performers backstage.

South America Voyage January 7-31: Cruise from Brazil through the Strait of Magellan and Beagle Channel to Santiago, Chile. Fly to Iguaçu Falls.

Thailand and Burma January 9-29: In Asia's most exotic countries, explore colorful cities, remote villages and archaeological sites.

Performing Arts of Russia January 10-24: Enjoy the best of Russian ballet, opera, symphony, folk dance and theater.

Siberian Winter Odyssey January 24-February 6: A thrilling winter exploration awaits you—dash through majestic countryside in a troika, ride the Trans-Siberian Express, visit Moscow and Leningrad.

Mesoamerican Study Programs January and February: Choose from three itineraries —Yucatán Adventure, Zapotec and Maya Mexico, Guatemala Adventure. Explore archaeological treasures, natural beauty.

India Wildlife Safari January 22-February 17: Travel by elephant and jeep to observe rare species of birds and animals in India and southern Nepal.

Tanzania-Kenya Wildlife Safari January 25-February 14: A unique wildlife excursion featuring the best of East Africa.

A Hike in New Zealand February 14-March 5: From Lake Te Anau to Milford Sound, discover wildflowers, crystalline lakes and snowcapped peaks on the Milford Track.

Australia-New Zealand February 21-March 15: An intriguing introduction to the natural history and culture of lands "down under."

Costa Rica March 11-24: An expedition for nature enthusiasts to see flora, birds and other wildlife in the American tropics.

Chile-Bolivia Voyage March 24-April 6: Aboard the *Illiria* travel up the coast of Chile to Bolivia. Explore archaeological finds, crystal clear lakes and the magnificent Atacama Desert.

Caribbean Voyage March 28-April 4: Sail from the Panama Canal to Curaçao aboard the four-masted, square-rigged bark *Sea Cloud*. Calls include the San Blas Islands, Cartagena, Aruba.

Berlin April 14-29: Experience the two sides of Berlin, East and West, named Cultural Capital of Europe for 1988.

May in Greece May 6-21: Marvel at classical wonders and beautiful landscape from Athens to Thessaloníki.

European Countryside Programs May-September: Reside in scenic and historic areas of Hungary, England, Austria, France, Switzerland, Germany, Wales or the Netherlands.

Write Smithsonian National Associates, 1100 Jefferson Drive SW, Washington, DC 20560 or call (202) 357-4700 for tour brochures

Washington

Smithsonian Seminars

Expand your educational horizons as you combine a pleasure-filled visit to the nation's capital with stimulating week-long courses of study that highlight Smithsonian museums and research facilities. From January 10-15, Smithsonian scholars will lead three exciting seminars. Discover the Institution's two new museums, the Sackler Gallery and the Museum of African Art, during lectures, behind-the-scenes visits and tours of world-famous collections. Or, study the fine points of creative writing with a SMITHSONIAN editor.

Splendors of Asian and Near Eastern Art

Trace the history of Asian and Near Eastern art with scholars from the Sackler and Freer galleries. Enjoy lectures and tours that feature Chinese bronzes of the ancient Shang and Zhou dynasties, Chinese decorative art and painting from the 10th century A.D. to the 1950s, ancient Near Eastern metalwork and ceramics and contemporary Japanese art. You'll also visit private and public collections of Indian and Tibetan art.

African Art at the Smithsonian

Discover Africa's rich artistic heritage as you tour the Museum's permanent collection and special exhibitions ranging from West African strip-weaving to the royal art of Benin. Learn about the close relationship between traditional African art and the cycle of life as you examine objects associated with the rites of passage. Explore the variety of materials used by artists to create beautiful utilitarian objects. Train your eye to appreciate the finest examples of African art during sessions devoted to esthetics.

The Art and Craft of Creative Writing

Study the techniques of successful creative writing with Edwards Park, author of SMITHSONIAN's monthly column *Around the Mall and beyond.* Learn how to establish a novel point of view and appeal to the senses through artfully chosen words and images. Immerse yourself in the colorful range of activities at the Smithsonian museums and share your written impressions with classmates during daily discussion sessions.

All seminars include opening and closing festivities and a related publication. Accommodations are available at the Grand Hyatt Hotel, near the Mall.

Aviation Buffs: Aircraft Restoration Workshop, November 8-14, 1987. Space still available.

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By Richard Wolkomir

With tabloids, 'Zip! You're in another world!'

Tabloidworld! It's another dimension, and it's a doozy!

I found this parallel universe—it's like ours, but with more gusto!—while waiting in a supermarket check-out line, browsing through the magazine racks by the register. My eyes popped! As the tabloids themselves would put it: "Bored Shopper Gets Hooked . . . On Exclamation Points!"

Spooky as it seems, tabloids are a warp in space-time! That's right—a portal between our humdrum world and the next dimension, where evidently all hell is breaking loose. As one Tabloidworld screamer headline recently put it: "Expert Says Vampire Attacks Down Due To AIDS!"

At least there's a bright side! With all those vampires fretting over their health, at least citizens can wake up mornings without worrying whether their hemoglobin is missing! Rampant vampirism, however, is only one Tabloidworld calamity. Now sucrose addiction is turning citizens into sugar zombies: "300-lb. Mom Swaps Twins For Cookies," said a recent headline, adding for the record, "Just to satisfy her sweet tooth craving...."

For years I shunned the tabloids stacked by the supermarket register for being as tawdry and lurid as a state fair's midway, and just as alluring. I didn't want anyone to see me peeking into those neon-lit pages, like a farm boy goggling at the the midway's hootchy-kootchy tent.

Then, at a Barbados resort, I met a Boston electronics firm's high-voltage president, who told me his secret for relaxing after a turbocharged day in the corporate cockpit. "It's a fire in the fireplace, a glass of vintage chablis from the wine cellar and a stack of tabloids!" he said. "Zip! You're in another world!"

The next time I shopped, I grabbed a handful of tabloids and stood in the check-out line, brazenly reading. In Tabloidworld, I found, things like nuclear tension, homelessness, the national debt, looming ecological disaster and the trade imbalance do not exist. Space invaders, on the other hand, are a constant headache: "Cave Explorers Find Alien Mummy," proclaimed one screamer, adding "Glass coffin dates to the Ice Age! Human-like creature has green skin and wings like an insect!"

The story ended with a stand-your-hair-on-end quote from the archaeologist who found the alien in the crystal coffin: "With a creature such as this," said the Turkish man of science, "I'm not at all certain it really is dead."

Standing there in the supermarket, I had no time to break out in a cold sweat, because another headline caught my eye: "Giant UFO emerges from the ocean and stalks a freighter!" Apparently, a skyscraper-size saucer had popped out of the waves, buzzed a Japanese freighter and then splashed back into the sea, creating huge waves. Complained the beset freighter's captain, "Some of my best men were huddled below deck crying just like women and babies."

In the tabloid dimension, death is frequent, and weird. "Ghoulish wife turns husband into goulash," for instance. The story—"Stewpot Shocker!"—claimed Singapore police had arrested the wife for settling a spat by grinding up her husband and cooking him. Helped by her butcher brothers, she converted her departed husband into about 40 gallons of goulash, then poured him into small plastic bags and threw him out with the trash. A police spokesperson announced, "We recovered him in more than 100 individual portions."

Tabloidworld is rife with such shocks. Take, for example, a recent headline's succinct "Camel eats punker's grassy green hair." And rich in adjectives: "Pimply-faced Peter, 18, awoke with a horrified shriek as the humpbacked critter yanked his daffy hairdo. . .roots and all."

By comparison, our world suffers from exclamation-point anemia. Oh, we have the occasional odd twist of fate or macabre murder. But we are so preoccupied with earning a buck and rinsing the road salt off the car and planning dinner that we miss the drumrolls and trumpet blares.

We are content, for instance, just knowing that the Prince of Wales' younger brother has finally settled down with a nice girl. But Tabloidworld's royals are more dramatic: "Fergie Pregnant—With Sextuplets?" In Tabloidworld even dinners are more profound: "Spaghetti & Sardine Diet Can Save Your Life."

Tell that to your doctor. And, while you're at it, tell him "Woman eats $20,000 worth of diamonds." The Tiffany diet?

There are other Tabloidworld virtues, of course. Frugality. My favorite was "Frugal gramps yanks his own teeth to save cash." There was grinning Gramps, on page one, clamping a giant pair of pliers to one of his ivories, ready for that cost-saving yank.

Parental vigilance, too: "Sharp-eyed dad spots hospital snafu and saves daughter's life: My baby's here for an eye exam—not hernia surgery!" And refreshing career tips: "Bored wife leaves wealthy husband to become bag lady!" And good-housekeeping hints: "Mom Dyes Twins Red & Green So She Can Tell Them Apart!" And how about that recent classic, "Woman Eaten By Pigs"?

I've got the fire crackling, and the chablis is cold. I'm going to look into "Dead Man Revives During Autopsy." After that, it'll probably be "Hungry ghost eats her out of house and home." Inquiring minds *do* want to know!

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